RUSS OLSON VOLUME 10

EQUIPMENT

Description

Horsecars, Cablecars, Original Electric Cars

Sub-divisions Within This Volume

- Contents of the Front Pocket
- Contents of the Entire Binder
- Contents of the Back Pocket

CONTENTS OF

FRONT POCKET

SPCR

1-15-1887 Mtg Bond issue :

	93 Horsecars
129-144	16 Horsecars/ Cable Trailers
145-151	7 Horsecars
152-163	12 Cable Grip Cars
▶ -1888	128 cars

9-1888	200-216	17
-1888	164-171	8
		153

Horsecars only (?)

	93	
129-144	16	Closed
145-151	7	Closed
200-216	17	Open
	133	
303-317	15	Closed
	148	
318-327	10	Closed
	158	159 directory

217-235	19	Open
236-245	10	Open

OLD DATA SHEETS

1	505, 509-510, 513, 516, 524, 536, 538, 1523, 1529, 1534	ST DE NORTHERN
2	540-547, 549-551	O-x-m OPEN
3	?	?
4	707-731	O-x-tr OPEN

46	1-2	WRECKERS ST
51	448, 452, 470, 471, 473, 490	SANDERS & SALTERS ST
56	11	WORK CAR

70	1	AUTO BUS
71	2	TROLLEY BUS
72	3	TROLLEY BUS
75	1-2	WIRE CARS ST
76	3	WIRE CAR OLD 3. NEW ?.
78	5	WIRE CAR

project: The Grid Record
12-31-1894

	MSR	SPCR	TOTAL	
Passenger Motors	360	217	577	(*)
Passenger Trailer	167	105	272	(#)
	527	322	849	
Cable Grip Cars		38	38	
			887	
Miscellaneous Equipment				
Salters	18	33	51	
Scrapers	7	9	16	
Snow Plows	15	22	37	
Snow Sweepers	—	2	2	
Supply Cars	3	—	3	
Horse Cars	20	23	43	

(*)	MSR	284, 303-422, 443-538, 540-547, 549-551, 555-731	405
		Less 1 car destroyed by fire 1891	(1)
	SPCR	328-369, 503-539, 541-634	173
			577

(#) Same as 1-18-1893 Closed 109 + Open 97 + Cable 66 = 272

April 1896

	MSR	SPCR	Total	
Motors	360	217	577	
Trailers	190	125	315	(**)
Cable Grip Cars	—	38	38	
Supply Cars	3	—	3	
	553	380	933	

(**) Plus 43 from 12-31-1894. ~~Could be from 14 ft Trailers~~
~~MSR 19 + SPCR 16 = 35 and 14 ft Motors MSR 13 = Total 48~~
Note that 12-31-1894 has 43 Horse Cars. Did they become Trailers? Or just reclassified as Trailers?

WHEELS 1893-1899

SRJ Feb 1893
33"wheels adopted as standard. Cast wheels are mostly of Whitney's make (1) while some were made by the Northern Wheel & Foundry Co. of St.Paul (recently moved from Milwaukee). Five of the Interurban cars are equipped with the cushioned wheels manufactured by the Cushion Car Wheel Co. of Indianapolis.
The Allen Paper Wheel is emplyed on most of the double trucks.

SRJ 3-8-1895 letter from Goodrich. We have used since November 1892 a large number of Allen steel wheels, 33" diameter, under our large interurban cars running between Minneapolis and St.Paul.

SRJ 2-15-1899: Allen steel-tired wheels are used on the powered axle of double trucks (the leading wheel on each truck). Have about 400 such wheels.

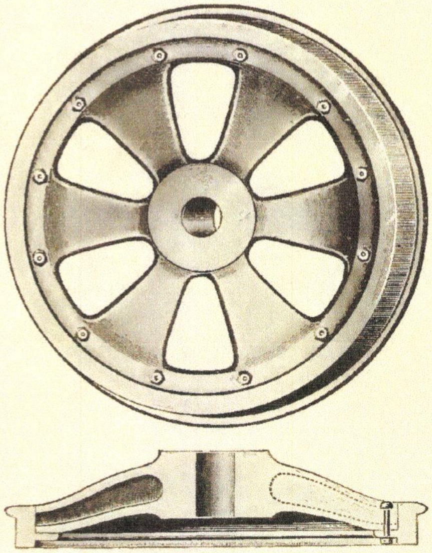
The photo of 793 (ex StP&WB RR) on the Minnehaha Falls line indicates a different make of wheel on the Bemis C.B. trucks.

(1) A. Whitney & Sons
Whitney Car Wheel Works
Philadelphia

assures a very substantial support. Mr. Geo. W. Wells is a civil engineer and street railway contractor, and he invented this chair to meet requirements which, in his long and varied experience, he has found necessary to a perfect road-bed. Although the invention is of recent date, it has been adopted by two prominent roads of the country, to one of which, the Worcester Consolidated Street Railway, the manufacturer refers by permission. Those who contemplate making extensions or alterations during the spring will do well to investigate the merits of this new device.

The Latest Paper Wheel.

IN October, 1890, the Allen Paper Car Wheel Co., of Chicago, brought out a filled car wheel for street cars, designed to be the same to the street car service that their large wheels are in the steam railroad service. In point of fact, in street cars running on only four wheels, as most of them do, the wheels are so rigidly fastened to the car sill that the noise when in motion is directly transmitted to the interior of the car; and in winter when the ground is frozen is often almost unbearable. Recently the Allen Company have made a great improvement in their street car wheel, and now make a spoke-filled wheel which is a great improvement even on the first brought out.

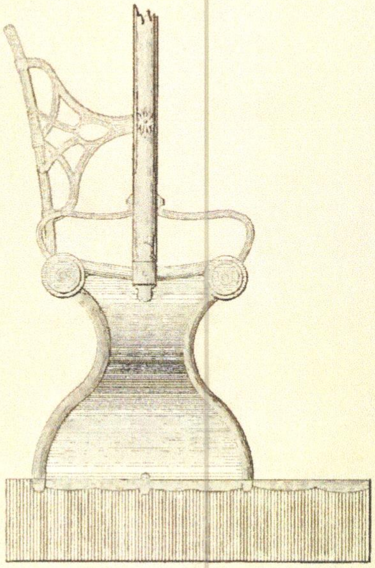


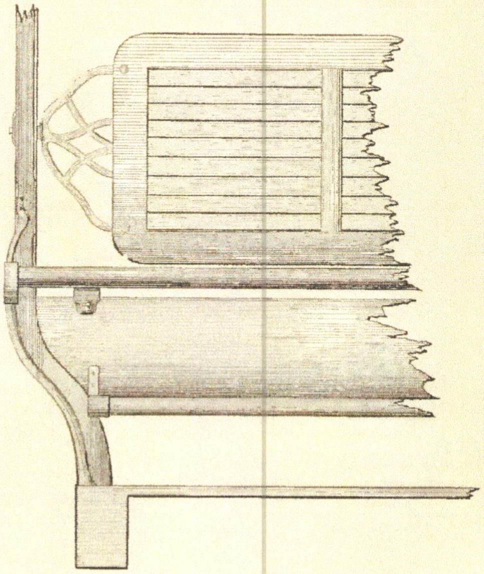
A Bent Post.

THESE posts are bent by steam and will never straighten out if bent properly, being put on a mould and pressed into shape, making the post much stronger than a post that is sawed to shape, as there is no cross grain.

The frame of the panel as shown in the smaller cut is also bent to shape and the panel let into a grove in the same, and these panels will never split when put in in this way.

Nine of these cars are being built for the Union Electric Company, of Boston, for their storage battery cars. Three will be run on the Beverly & Danvers road, at Beverly, Mass. Six cars are also being built on this pattern for the Hopedale & Milford, Mass., road, of solid mahogany throughout: all of the wood that shows on both the outside and inside of the car is of this material, making a remarkably handsome car. These cars are wired for electric bells, and electric registers will be used.



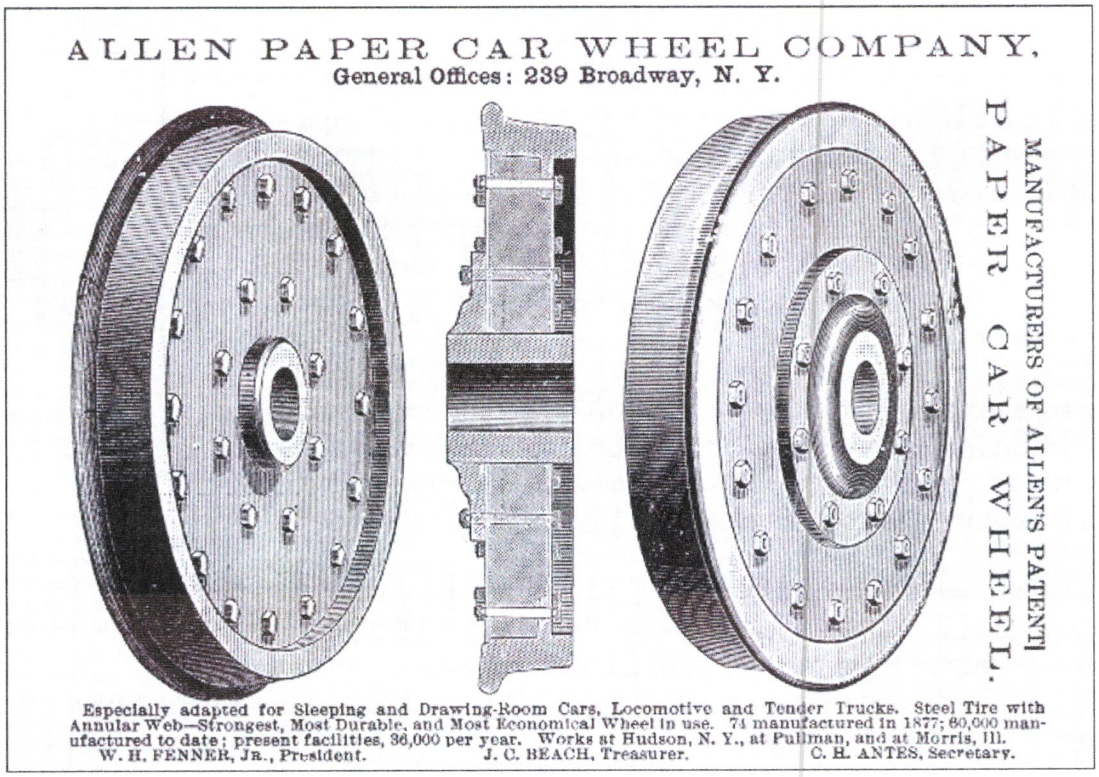


The lower panel of these cars are hung on a hinge to let down when changing the batteries. They are also building a lot of large open cars for the West End Street

A Car-Builder's Dictionary

Paper Wheels

The term “Paper” wheels is really a misnomer. These were fabricated wheels made up of a cast iron hub bolted to an iron disk and a wrought iron or steel tire bolted to another disk, with the two disks bolted together through a sandwich of paper maché. The paper served to insulate the vibrations of the tire against the rail from transmission to the hub and thence to the car body.



ALLEN PAPER CAR WHEEL COMPANY,
General Offices: 239 Broadway, N. Y.

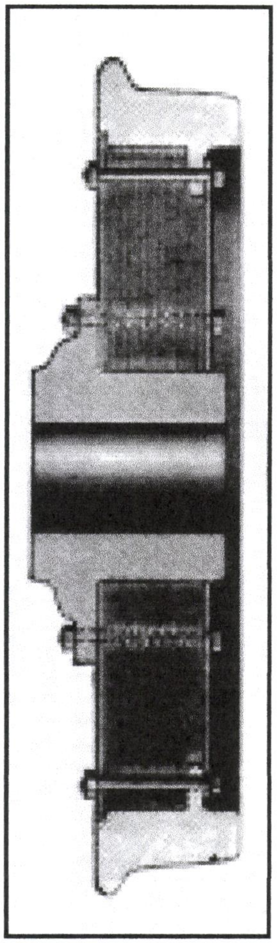
PAPER CAR WHEEL.
MANUFACTURERS OF ALLEN'S PATENT

Especially adapted for Sleeping and Drawing-Room Cars, Locomotive and Tender Trucks. Steel Tire with Annular Web—Strongest, Most Durable, and Most Economical Wheel in use. 74 manufactured in 1877; 60,000 manufactured to date; present facilities, 36,000 per year. Works at Hudson, N. Y., at Pullman, and at Morris, Ill.

W. H. FENNER, Jr., President. J. C. BEACH, Treasurer. C. H. ANTES, Secretary.

Cast iron wheels had always been the standard for railroad wheels, but were subject to failure due to imperfections in the casting process as well as extremes of temperature such as being heated by dragging brake shoes during chill winter months. (***White/Passenger***-532ff has an extensive discussion of this.) A number of experiments were performed using a combination of cast iron hub and wrought iron tire with wood between. These wood-centered wheels had been introduced in England as early as 1848, and by 1860 were being tried in this country.

The inventor of the “paper” wheel was a former locomotive engineer, Richard N. Allen (1827-1890). Allen had tried a number of occupations before being persuaded by his brother to become part-owner of a paper mill at Pittsford, Vermont. The mill’s primary product was a cheap grade of strawboard of which there was already a plentiful supply, so Allen soon found himself with little business. He set out to find other uses for his strawboard, and from his railroad experience decided to try substituting the strawboard for the wood in fabricated wheels.



In Allen's earliest process, circular sheets of paper were glued together with flour paste until sufficient thickness was obtained, then compressed by a 650 ton press for three hours. They were then allowed to dry for six to eight weeks under controlled temperature to evaporate all moisture. This paper disk, now resembling a wooden wheel, was then turned to size on a lathe. Holes were drilled through it, and it was bolted between two ¼" iron plates with 24 bolts or more. The outer ring of bolts held the outer iron disk in contact with the tire, while the inner ring of bolts held the inner iron disk in contact with the hub.

One disk held the tire, while the other held the hub. The paper separating the disks, though greatly compressed and nearly as hard as ivory, was just spongy enough to cushion the ride and deaden the sound of the wheels grinding over the rails.

Allen began business in 1868 as the American Paper Car Wheel Company. In 1869 he got a U.S. patent on his design. But the idea of a "paper" railroad car wheel was more a joke than anything else. Until, that is, the day in 1870 that George Pullman purchased a set of Allen's wheels. They worked well, and Pullman bought more. Ever the publicity hound, Pullman probably adopted the wheel as much for the publicity as for its merit. But his patronage converted the paper wheel from an oddity to a staple of luxury railroad travel.

Allen established a plant in Hudson, NY in 1873, and advertisements exist for the Hudson Paper Car Wheel Co., though what relationship that had to Allen is unknown to this author. By 1881 Pullman was using so many of Allen's wheels that Allen's main plant was located on the grounds of Pullman's Chicago works.

More and more of the Allen patent wheels were produced, to the point that in 1886 the firm announced it had 60,000 wheels in service. Seven years later it had 115,000. This, of course, drew many imitators, using many different, and sometimes downright weird schemes. In 1897 the nine most important manufacturers of fabricated wheels combined to form the *Steel Tired Wheel Company*.

The company prospered for a decade, then went into decline. The weight of steel cars was too great. Greater speed put more stress on the wheels. And the advent of new steel technology made fabricated wheels obsolete.

Patents for "Paper" Car Wheels

Pat. No.	Date	Recipient(s)	Remarks
89,908	11 May 1869	R.N. Allen & L.W. Kimball	Basic patent
128,939	16 July 1872	Richard N. Allen	Improved construction of wheel
RE7,142	30 May 1876	Richard N. Allen	Reissue of 89,908

I didn't copy page 3

CONTENTS OF
ENTIRE BINDER

SUMMARY ROSTER 1872/1875 -1897

Minneapolis Street Railway

1-6	10 ft. Closed Horsecars	Jones	1875	
7-10	10 ft. Closed Horsecars		1875	
11-16	10 ft. Closed Horsecars		1876	
17	10 ft. Closed Horsecar		1877	
18-21	10 ft. Closed Horsecars	Jones	1878	
22-31	12 ft. Closed Horsecars	Jones	1880	
32-56	12 ft. Closed Horsecars	Jones	1881	
57-86	12 ft. Closed Horsecars		1882	
87-111	12 ft. Closed Horsecars	J G Brill	1883	
112-136	14 ft. Closed Horsecars	Brownell	Feb 1884	
137-152	16 ft. Closed Horsecars	Stephenson	May 1885	
153-166	16 ft. Closed Horsecars	Brownell	June 1885	
167-194	16 ft. Closed Horsecars	Pullman	Aug 1886	
195-200	16 ft. Closed Horsecars	Pullman	Feb 1887	
201-232	24 ft. Open Horsecars	Pullman	Jul 1888	
233-262	24 ft. Open Horsecars	Jones	Jun 1888	
263-302	16 ft. Closed Horsecars	Jones	1888	Converted to Electric Motor Cars 1890
303-362	24 ft Open Motor Cars	LaClede	Dec 1890	
363-422	18 ft Closed Motor Cars	LaClede	Feb 1891	
423-442	24 ft Open Trailers	Robinson & Moan	Mar 1891	Motor Cars until Dec 1891
443-502	18 ft Closed Motor Cars	Jones	Aug 1891	
503-522	18 ft Closed Motor Cars	Northern	May 1891	
523-538	18 ft Closed Motor Cars	Northern	Dec 1891	
539-554	34 ft Open Motor Cars	Northern	Apr 1892	540-547,549-551 only
555-568	34 ft Open Motor Cars	Northern	Apr 1892	Rebuilt ML&M Ry. Trailers
284/569-606	22 ft. Closed Motor Cars	Lengthened by MSR Dec 1891, Jul 1892 from 263-302		
607-626	41 ft Closed Motor Cars	American	Jul 1892	
627-706	27 ft Open Motor Cars	American	Jan 1893	
707-731	40 ft Open Motor Cars	American	Jan 1893	
732-735	44 ft Closed Motor Cars	Rebuilt	Nov 1896 from ?	
789-796	34 ft Closed Motor Cars	Pullman 1892	Acq 1898	St Paul & White Bear RR 1-8

St. Paul Street Railway

1-4	8 ft.? Closed Horsecars	Andrew Wight	1872
5-6	8 ft.? Closed Horseccrs		1872
7-10	8 ft.? 10 ft.? Closed Horsecars		1874
11-15	10 ft. Closed Horsecars		1875

St. Paul City Railway

Acquired 12 cars from the SPSR mortgage foreclosure sale in 1878; apparently retained the SPSR car numbers. Must have acquired two additional cars based on car numbering.

15-17	10 ft. Closed Horsecars		1879	
18-25	10 ft. Closed Horsecars		1880	
26-27	10 ft. or 12 ft. Closed Horsecars		1882	
28-37	12 ft. Closed Horsecars		1882	
38-49	12 ft. Closed Horsecars		1883	
50-86	14 ft. Closed Horsecars		1884	
87-128	14 ft. Closed Horsecars	Stephenson and Brownell	1886	
129-144	16 ft Closed Cable Trailers	Pullman	Jun 1887	
145-151	16 ft Closed Horsecars	Brownell	1887	
152-163	18 ft Open Cable Grip Cars	LaClede	1887	
164-171	18 ft Open Cable Grip Cars	LaClede	1888	
172-191	18 ft Open Cable Grip Cars	LaClede	1889	
192-199	18 ft Open Cable Grip Cars	LaClede	1890	
200-216	25 ft Open Trailers	LaClede	Sep 1888	Horsecars/Cable Trailers
217-235	25 ft Open Trailers	LaClede	Dec 1888	Cable Trailers
303-317	16 ft Closed Trailers	LaClede	Dec 1888	Cable Trailers
236-245	25 ft Open Trailers	LaClede	Apr 1890	Cable Trailers
318-327	16 ft Closed Trailers	LaClede	Aug 1890	Cable Trailers
328-369	18 ft Closed Motor Cars	LaClede	Feb 1891	
503-527	18 ft Closed Motor Cars	Stephenson	May 1891	
528	22 ft Closed Motor Car	Northern	Dec 1891	Rebuilt from two Stephenson Horsecars spliced
529-539	16 ft Closed Motor Cars	Stephenson	Dec 1891	
540	35 ft Closed Motor Car	Northern	May 1892	NWT-H Co Test Car
541-569	22 ft Closed Motor Cars	Northern	Jun 1892	Lengthened from Closed Motor Cars converted from Horsecars
570-634	28 ft Open Motor Cars	American	Jan 1893	

EQUIPMENT

HORSECARS, CABLECARS, EARLY ELECTRIC CARS

HORSECARS: GENERAL INFORMATION

The early designs of horsecars were of the closed body type with longitudinal seats provided along each side. Due to the limitations of animal power extremely light construction was employed. The one-horse, one-man, "bobtail" car was the first development for purely city service. The bodies of this type car were usually 10 ft. or 12 ft. long over the bulkheads; the overall length of the car was omitted from measurement references. These early cars were single-end operated, with a platform for exclusive use of the driver at the front end and with passengers entering at the rear end. Sometimes a full platform was installed at the rear end, but more often only a step leading to a rear entrance door in the rear bulkhead was supplied, thus the term "bobtail".

With the growth of street railway business, increased car capacity was needed. This led to the construction of cars of 16, 18 and 20 ft. body length over the bulkheads, usually drawn by two horses. In some cases these cars were handled by the driver alone, but more frequently they were arranged for two-man operation. Often these larger cars were equipped with full platforms at both front and rear ends, and could be quickly reversed at terminals by walking the team of horses around to the opposite end of the car.

Closed cars were the most common type. However open cars were also developed fitted with transverse benches running the full width of the car with full length running boards on each side for boarding and alighting. Unlike closed cars, references to length measurements of open cars pertained to the overall length of the entire car.

MINNEAPOLIS ST. RY.
HORSECARS

Six cars were purchased new for the first line in 1875 at a cost of $872 each, including freight. Another source reported that six cars were acquired second-hand from New York. Two cars arrived in the city on August 20th from Duluth via the Great Lakes. The first line opened September 2nd with these two cars. One source stated that these two cars were the two abandoned cars from the 1873 attempt which had been rehabilitated. Two more new cars arrived September 22nd. The records don't report when the last two new cars arrived. Fifteen minute service on the first line required five cars. A photograph of #1 shows it with a six-window body, turtle back roof, bobtail rear end. An identical car was photographed in service during 1881.

By December 31, 1875, ten horsecars were owned. These original horsecars measured 10 ft. over the bulkheads, had four light wheels and weighed about 1,000 pounds. The body had a turtle back roof, bobtail rear end, and two longitudinal seats seating 14 persons total. The driver was exposed to the weather on the front platform from which he guided a single horse. Interior illumination was by oil lamp. A small sheet-iron stove in the middle of the car supplied heat supplemented by a foot thick layer of hay on the car floor. A small bell on the horse's collar signaled the car's approach. At night bulls-eye colored signal lamps were placed on both ends of the car. Cars of each line were painted a distinctive color and were used only on that particular line. The "University" line (the first line) cars were blue, while the "Washington Ave." line cars were yellow.

By 1878 eighteen horsecars were being operated. A photograph of #17 shows it with a six-window body, bombay roof, and rear platform. As of 1880 the company owned 21 horsecars, probably all with 10 ft. bodies,90 horses, and employed 35 persons.

New horsecars were being unloaded May 27, 1881, in the CM&StP RR yards, lettered "Western Ave. & Broadway St. N.E.". A photograph of #29 shows it with a five-window body, 11-window bombay roof, rear platform, and stove chimney on the front platform.

Summer 1881: some older cars were sold to a city (not named) in Missouri.

During 1882-1883 more cars were purchased. Photographs of #37, #39, #43 show them to be identical: five-wndow body, bombay roof, rear platform. They had a different paint scheme than #29. An engraving of #62 shows it similar to #37 but with front and rear platforms, 11-window bombay roof. The photo of #74 shows it with a five-window body, 11-window bombay roof, and rear platform. Photo of #107 shows a five-window body and deck roof. Probably all these cars had 12 ft. bodies.

Expansion continued during 1884. Photographs of #130 and #132 show them to be identical: five-window body, (probably 14 ft.), 15-window bombay roof, bobtail rear end. There is a reference to an order of 25 cars from Brownell & Wight with a date of 2-1-1884. There are mechanical dept. record cars for two cars that unfortunately do not indicate company identification.

#135	Horse Car	Brownell 2-1-1884	16 ft. Trailer
#147	Sander	Brownell	14 ft. Trailer

I suspect #135 is an MSR horsecar but with a length of 14 ft.; #147 an SPCR horsecar, but length of 16 ft.

John Stephenson Co. builder's photograph of #137: based on the address numbers onthe factory building the date is 1885. Five-window (large) body, probably 16 ft., 17-window bombay roof, bobtail rear end. A photo of #154 as a Trailer in 1904 is identical except for the front and rear platforms and different pedestal wheel-mounts.

> The pedestal mounts were apparently changed with the cars were converted from narrow-gauge to standard gauge during 1888-1890. The platforms were added when the cars were converted to Trailers.

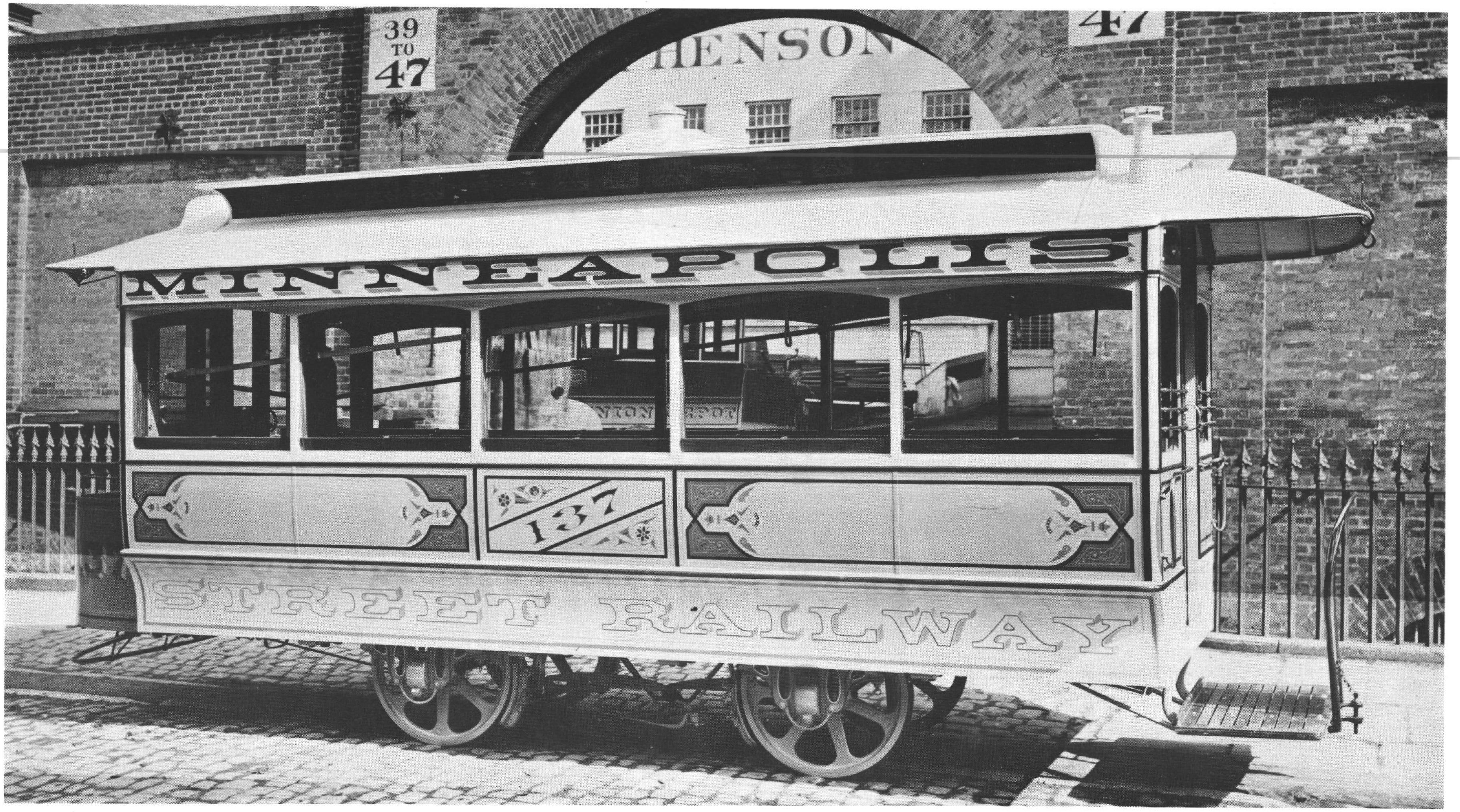
A November, 1902, newspaper article about dumping old carbodies at Bryant Ave. and 31st St. mentions #152, a dumpy green car, ex-Washington Ave. horsecar and later a trailer.

8-16-1886: Pullman's Palace Car Co., Chicago Shops, 16 ft. six-window body, deck roof, front and rear platforms. These were considered substantial well-built cars. Photographs exist of #167, #181, #188, #190, and #191, all identical. The order may have been for 28 cars numbered 167-194.

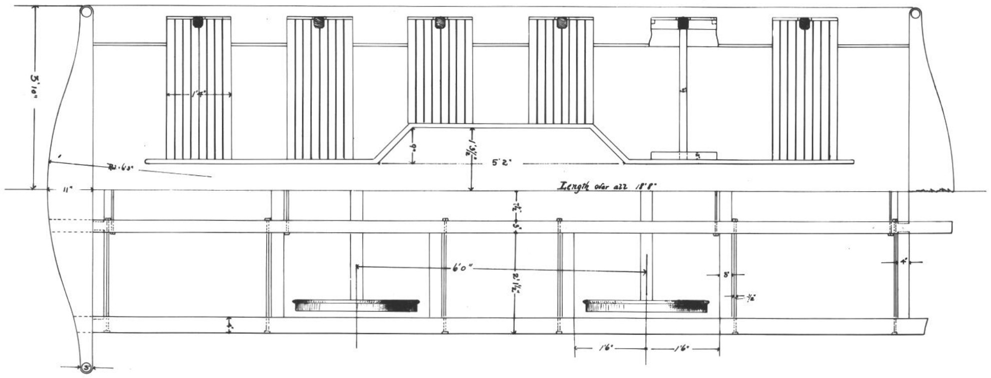
Pullman's Palace Car Co.,Chicago Shops, order records available today begin with number 500 dated 9-24-1886. Order 505 covered six closed horsecars built for stock. Four were sold to MSR 2-24-1887 numbered 195-198. The remaining two cars were sold to MSR 3-24-1887 numbered 199-200. A photograph of #195 is identical to those of the 167-194 series.

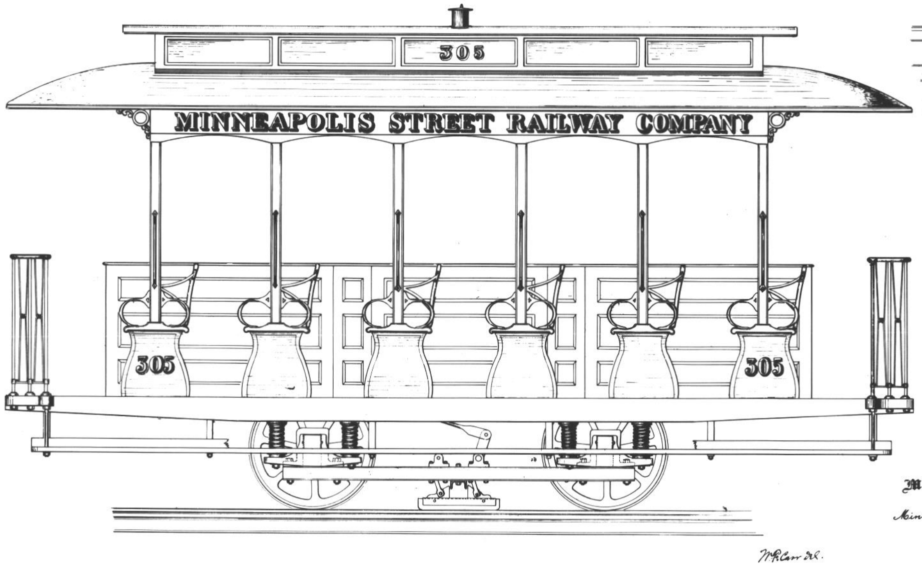
October 1888 Street Railway Journal directory: 186 horsecars, 927 horses and 186 mules. Number 200 was the highest car number used at this time which implies that fourteen horsecars had been sold from 1881-1888.

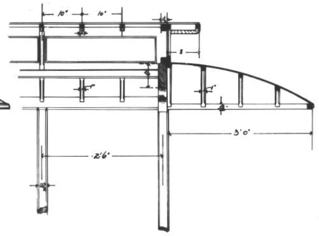
AVERY POLY-VU

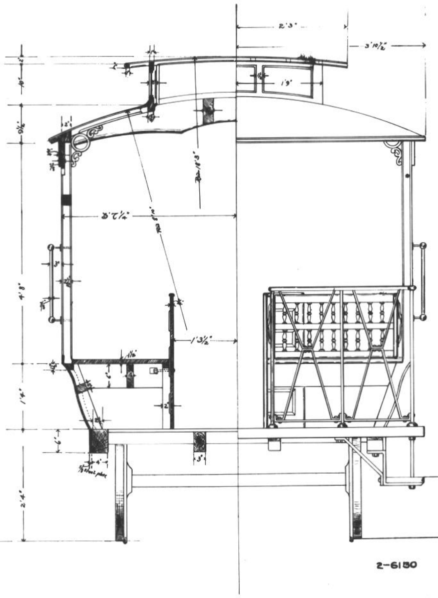

39
TO
47
HENSON
47
MINNEAPOLIS
137
STREET RAILWAY
NION EPOT

98 Minneapolis' entry into the horsecar age was relatively late for a major city. The first line opened in 1875, and eleven years later the St. Paul and Minneapolis twin-city systems merged. The extreme body overhang on the 137 is explained by the company's narrow track gauge of forty-two inches. The body appears to be full size; the large windows are also worthy of notice. 72-2844


5'10"
1'9"
5'2"
Length over all 18'8"
11"
6'0"
1'6"
1'6"


305
MINNEAPOLIS STREET RAILWAY COMPANY
305
305




2'3"
3'11½"
3'7½"
4'8"
1'3½"
2'4"
1'3"

Minneapolis Street Railway Company.

— GRIP CAR —

Minneapolis Minn, Jan 11th 5

SCALE 1"=1'

332

Engineer —

Wm. Carr del.

2-6150

During October 1887 conductors were first used on a few lines as the larger new cars which had been ordered were received and placed in service.

Pullman's Palace Car Co. order number 545 dated 3-26-1888 covered 32 open horsecars for Mpls. St. Ry. numbered 201-232. These were 24 ft., 8-bench cars, the first open cars in Minneapolis. The mech. dept. record cards carry a date of 7-11-1888 which probably is the date first received or entered service.

The mortgage bond trust agreement dated 1-15-1889 gave a figure of 218 horsecars and 1,018 horses and mules. This is an increase of 32 cars compared to the October 1888 directory figure, which presumably accounts for the order of 32 open cars #201-#232. However there were additional car orders apparently received during 1888. These large orders were probably due to equipment modernization programs, increased patronage and service, and the conversion from narrow gauge to standard gauge reportedly begun in 1888.

30 cars, #233-#262, 24 ft., 8-bench, open horsecars, built by J. M. Jones' Sons Car Co.; the mech. dept. record cards bear a date of 6-7-1888.

40 cars, #263-#302, 16 ft., closed horsecars, built by J. M. Jones' Sons Car Co.; there are no mech. dept. record cards on these cars as built as they were eventually rebuilt to motor cars.

The 1890 U.S. Census (7-1-1890) listed 264 horsecars and 1,073 horses. The 218 horsecars listed in the 1-15-1889 trust agreement plus the other 70 cars received during 1888 totals 288 cars; subtracting the 264 cars listed in the 1890 census results in a difference of 24 cars, apparently retired or sold during 1889-early 1890. A later 1890 directory lists 252 horsecars indicating an additional 12 cars had been sold or retired. It was reported that some horsecars were sold to Helena and Billings, Montana; Duluth, Minnesota; and LaCrosse, Wisconsin. It was also reported that "numerous" western cities acquired old Minneapolis and St.Paul horsecars. The total dispositions calculated foregoing from 1881 throuth 1890 total 50 cars.

Horsecar #1 was still in existence as an historical relic in 1891 but its subsequent disposition is unrecorded.

A June, 1891, issue of the Street Railway Journal contained an advertisement which offered for sale 63 12 ft. closed horsecars. An advertisement in a subsequent 1891 issue offered for sale 62 12 ft. closed horsecars all fitted with fare boxes and Small conveyors. That same advertisement also offered for sale 63 extra Slawson fare boxes and 76 extra Small conveyors for 14 ft. and 16 ft. horsecars.

Many of the closed and open horsecars were converted into trailers for the electric motor cars. Apparently 33 closed horsecars were converted to Salt Cars (20 common and 13 automatic) for use on the electric lines. The Frank Trumbull inspection report indicated that as of 1-18-1893 36 horsecars remained.

ST.PAUL ST. RY.
HORSECARS

The first horsecar line began operating in 1872 with four horsecars and eight horses. The four cars were purchased in July, 1872, from A. Wight, St.Louis, Missouri. #1 was a 10 ft. closed, bombay roof, horsecar. Purchase of two additional horsecars was authorized by the board of directors July 27, 1872.

In May 1874 additional cars were reported ordered for the "St.Anthony Hill" line. By August 1874 eight cars were needed for service plus two cars in reserve. During May 1875 new cars arrived to make a total of 15 cars owned as of May 28, 1875.

At the time of the sheriff's sale, September 28, 1877, 15 horsecars and two snow plows were owned. All of these were probably 10 ft. closed cars, seating 14 persons on longitudinal seats.

ST.PAUL CITY RY.
HORSECARS

A report given to the board of directors November 29, 1878, stated that 12 horsecars were owned; ordering more cars was proposed.

The board of directors authorized the purchase of additional horsecars: 6-17-1879 three new cars; 10-24-1879 eight new cars for spring 1880 delivery.

On October 28, 1880, it was reported that 14 cars had been used to operate the scheduled service. A planned increase in service requiring 20 cars would not be put into effect until spring 1881.

On February 13, 1882, the board of directors authorized Thomas Lowry to purchase two additional horsecars for the company at a cost of $700 each.

An 1882 directory reported that 28 horsecars were owned. Two horsecars were sold to Billings St. R.R., Montana, during 1882, and one horsecar to the Duluth St. Ry. in November 1882. Two more horsecars were sold to the Duluth St. Ry. in the spring of 1883.

Twelve new horsecars for the "St.Anthony Hill" line were ordered in the spring of 1883. Two cars arrived in December 1883 and the additional 10 were expected soon. These new cars cost $1200 each. About this time it was reported that the building erected in 1880 at the St.Peter St. facility housed the company's 36 horsecars.

An 1884 directory reported that 77 horsecars were owned. We have found no information as to car orders during this time period. A mortgage bond trust agreement dated 4-1-1884 listed ownership of 79 horsecars, 162 horses and 293 mules. When additional bonds were issued as of 10-1-1884 these identical figures were used in the mortgage bond trust agreement.

2-11-1886: the carhouse on Oak St. at the Smith Ave. facility was damaged by fire. Twenty-five cars, "including snow plows, employes' cars and tool cars" were in the building at the time. No mention if any were damaged or destroyed.

Excerpts from a newspaper article printed in the winter of 1887 provided a description of winter horsecar operation. "Snow is dry and easily pushed from the tracks by the scrapers hung in front of the wheels." "Formerly every car had a little stove on the front platform and connecting with it was a register that admitted hot air to the interior. This winter a new plan of heating has been adopted and a small stove in a zinc-lined box stands in the car on one side occupying about the room of one passenger. Many people think the old plan was best, for the car when crowded is usually uncomfortably warm, especially to passengers wearing furs." "You can't see out of the windows because of the accumulation of frozen moisture from the breath of passengers."

A subsequent mortgage bond issue trust agreement, dated 1-15-1887, listed ownership of 93 horsecars, 607 horses and mules. A photograph of #94 shows it to be a 5-window body, bombay roof, bobtail car; appears to be a 14 ft. closed car built by LaClede Car Co.

Pullman's Palace Car Co., Chicago Shops, order number 519 dated 6-29-1887 covered 16 closed horsecars for SPCR numbered 129 thru 144. These were deck roof cars with front and rear platforms. However phtographs exist of #131, #136 and #140 as cablecar or electric car trailers. It appears that all 16 of these cars were used as cablecar trailers, and nine later as electric car trailers.

On 9-27-1887 Thomas Lowry stated that SPCR owned 84 cars; orders had been placed to make a total of 150 cars. Apparently this refers mostly to cable grip cars and trailers.

A photograph taken after October 1888 of a horsecar #151 indicates a 5-window body similar to #94 but with a deck roof and platforms on both ends. One mech. dept. record card exists for #147 [redacted] in use as a Sander in 1904; it is listed as a 14 ft. Trailer built by Brownell, no date.

As to horsecars, various directories provide the following information.
October 1888: 128 horsecars.
1889: 159 horsecars, 900 horses.
1890: 108 horsecars.
The 1890 U.S. Census (7-1-1890) reported 113 horsecars, 742 horses.

The A.L. Drum & Company Valuation dated 1-1-1920 reported a total of 118 horsecars had been purchased. However as many of the horsecars were used as cablecar trailers and electric car trailers, or as work equipment, this may be a net quantity.

In December 1891 the horsecar barn at W. 7th and Lee Sts. was destroyed by fire along with 23 out of service horsecars.

Apparently 18 horsecars had been converted to Salt Cars (11 common and 7 automatic) as of Frank Trumbull's inspection report of 1-18-1893. As of that date he also reported 12 horsecars remained. This may have included car #1 which was retained as an historical relic. It was used during a 1922 observance of the 50th anniversary of streetcars in St.Paul. However it was destroyed in the storage shed fire at the Snelling Shops in August 1925.

ST.PAUL CITY RY.
CABLECARS

9-26-1887: 20 new cars for the "Selby Avenue" cable line arrived.

January 1888: contemporary accounts report that the equipment for the opening of the line comprised 12 grip cars and 16 trailers [#129-#144?]. Normal operation consisted of one grip car pulling one trailer. A St.Paul city ordinance limited the maximum cable train length to one grip car with two trailers. Photographs indicate the grip cars were probably all built by LaClede Car Co.; at least one was a 12 ft. 4-bench open, deck roof car (pulling trailer #207) the others 18 ft., 6-bench open, deck roof cars (one pulling trailer #206). However the Frank Trumbull 1-18-1893 inspection report does not list any 12 ft. open grip cars, only 18 ft. open grip cars.

On the afternoon of January 27, 1888, (the first week of operation) a cable train consisting of one grip car with one trailer lost the cable descending Selby Hill and both cars jumped the track at the curve from Selby Ave. onto 3rd St. Contemporary accounts state either one (trailer) or both cars left the track and rolled over. One passenger was killed and several injured, some seriously. Reports thereafter listed 11 grip cars and 16 trailers. If the trailer was also demolished it could have been easily replaced with another converted horsecar.

October 1888 directory: 10 grip cars and 16 trailers.

Street Railway Journal, July 1887, reported the St. Paul City Ry. had placed an order for 10 grip cars.

This may account for a street railway directory report of 10 cable grip cars. Could 2 additional cars have been acquired from a cancelled order (shorter four-bench open cars)? (And one wrecked in the January 1888 accident?)

Eighteen 25 ft. 8-bench open, deck roof, cars #200-#216 built by LaClede Car Co. The mech. dept. record cards carry a date of 9-1-1888. These were the first open cars in St.Paul. Some were used as cable trailers while others served as horsecars.

On December 12, 1888, it was reported that LaClede Car Co. was awarded a contract for 60 new cars for the "E. 7th St." cable line:
20 grip cars for 5-15-1889 delivery;
20 open trailers for 5-15-1889 delivery; and
20 closed trailers for 9-1-1889 delivery.
Actual quantities delivered differed slightly.
?? 18 ft. 6-bench open, railroad roof, grip cars.
19 25 ft. 8-bench open, railroad roof, trailers, #217-#235. The mech. dept. record cards carry a date of 12-20-1888.
15 16 ft. closed trailers, #303-#317. The mech. dept. record cards carry a date of 12-20-1888. Apparently due to the common management it had been decided to number all new open cars in the SPCR number series and all new closed cars in the MSR number series, the latter company's most recent order of cars being #263-#302.

A local periodical dated September 1889 reported that 20 closed cars had been ordered from LaClede Car Co. for April 1890 delivery for the Selby Ave. line extension. They were delivered as 10 open trailers and 10 closed trailers.
10 25 ft. 8-bench open, railroad roof, trailers. #236-#245. The mech. dept. record cards carry a date of 4-1-90 for $236-#238 and 8-1890 for #239-#245.
10 16 ft. closed, railroad roof, cablecar trailers, #318-#327. The mech. dept. record cards carry a date of 8-20-1890 on all ten cars.

Meanwhile, the first electric line in St.Paul opened 2-22-1890. A photograph of the first train indicates that it consisted of open motor car #169, converted from an 18 ft. 6-bench open cable grip car, and closed cablecar trailer #136. The 1890 U.S. Census (7-1-1890) reported 9 electric motor cars and 9 trailers. The Frank Trumbull 1-18-1893 inspection report indicates all 9 motor cars were converted open cable grip cars.

The 1890 U.S. Census (7-1-1890) reported 30 cable grip cars and 66 cablecar trailers, in addition to the 9 electric motor cars and 9 electric car trailers. This indicates that 28 additional open cable grip cars had been ordered and received during 1888 and early 1890. (Original 12 cars minus 1 wrecked minus 9 converted to electric operation = 2 cars left + 28 additional cars = 30 cars total.) Based on the Frank Trumbull 1-18-1893 inspection report and a mech. dept. data sheet it appears that another 8 open cable grip cars were received in 1890, after July 1st, probably for the Selby Ave. line extension.

Frank Trumbull's inspection report dated 1-18-1893:

18 ft., single truck, open cable grip cars	38 cars	
16 ft., single truck, closed cable trailers	34 cars	66 trailers total
25 ft., single truck, open cable trailers	32 cars	
Total cable equipment	104 cars	

On September 1, 1893, the "E. 7th St." cable line was converted to electric operation, thus creating a surplus of cable grip cars.

During 1894 and 1895, in compliance with the state's "vestibule law", those cable grip cars in active service were equipped with enclosures for the gripman to protect him from the weather. This consisted of an enclosure in the center of the car with glass windows on all sides above the seat backs installed on top of the existing partitions. A narrow door was located at the rear.

When the "E. 7th St." cable line was electrified on September 1, 1893, cable equipment and supplies were placed in storage at the old horsecar barns at University Ave. and Kent St.. This probably included unused cable grip cars. The barn was also used for storage of unused and disabled electric cars. The buildings were destroyed by fire in 1895 or 1896 along with approximately 100 cars that were in storage.

The "Selby Avenue" cable line ceased operation June 3, 1898, to permit conversion of the line to electric operation with construction of a counterweight operation on Selby Hill. Three of the 1890-built 18 ft. open, railroad roof, cable grip cars were rebuilt for operation of the counterweight system. This included enclosing the bodies, fitting them with a grip blade, and equipping them with one Peckham 7B truck, two Thomson-Houston W.P. 50 motors, and rheostat controller. During 1905 the three counterweight "pushers" (sic) and all "Selby Avenue" electric cars were equipped with automatic couplers.

No other information exists as to the disposition of the cable grip cars. All were gone by the time of the company survey taken September 1, 1904. The cable trailers were subsequently used as electric motor car trailers. The three "pushers" on the Selby Hill counterweight system became surplus in 1907 when that system was replaced by the Selby Tunnel. The three were taken to the newly completed Snelling Shops and used to shift streetcars and car trucks around the shop buildings; as such they were numbered 26, 27 and 28.

MINNEAPOLIS ST. RY.
ORIGINAL ELECTRIC CARS
1889-1892

1889

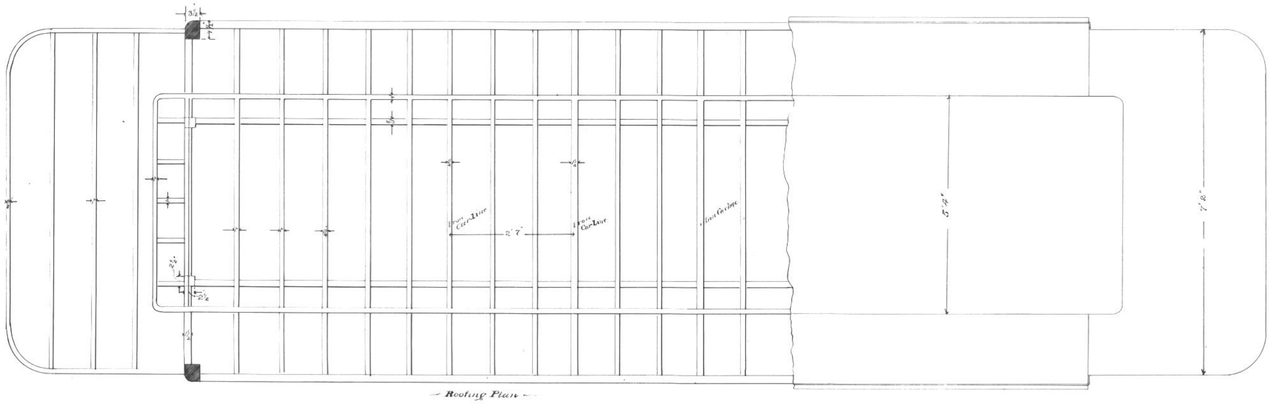
The first electric cars were ten 16 ft. closed horsecar bodies of the Pullman 1886 order placed on single electric motor trucks, each containing two 15 h.p. motors. Other cars from this same order were used as trailers. The first train over the "4th Ave. So." line consisted of motor car #188 pulling trailer #190.

1890

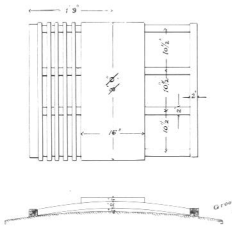
March 28th: contracted for 100 "double motors" (two 15 h.p. motors for each of 100 cars) from the Sprague Electric Railway & Motor Company.

Next all forty 16 ft. closed horsecar bodies of the Jones 1888 order, #263-#302, were placed on single electric motor trucks.

The first order of new cars was placed with the LaClede Car Company in early 1890 for 60 open cars and 60 closed cars for a total of 120 cars.
60 cars: #303-#362 24 ft. 8-bench open, deck roof, single-truck motor cars. The mech. dept. record cards carry a date of 12-9-1890 on these cars. Note that the numbers follow the previous MSR order of closed horsecars thus creating a duplication of numbers with SPCR closed cable trailers.
60 cars: #363-#422 18 ft. closed, deck roof, single truck motor cars. The mech. dept. record cards carry a date of 2-20-1891 on these cars.

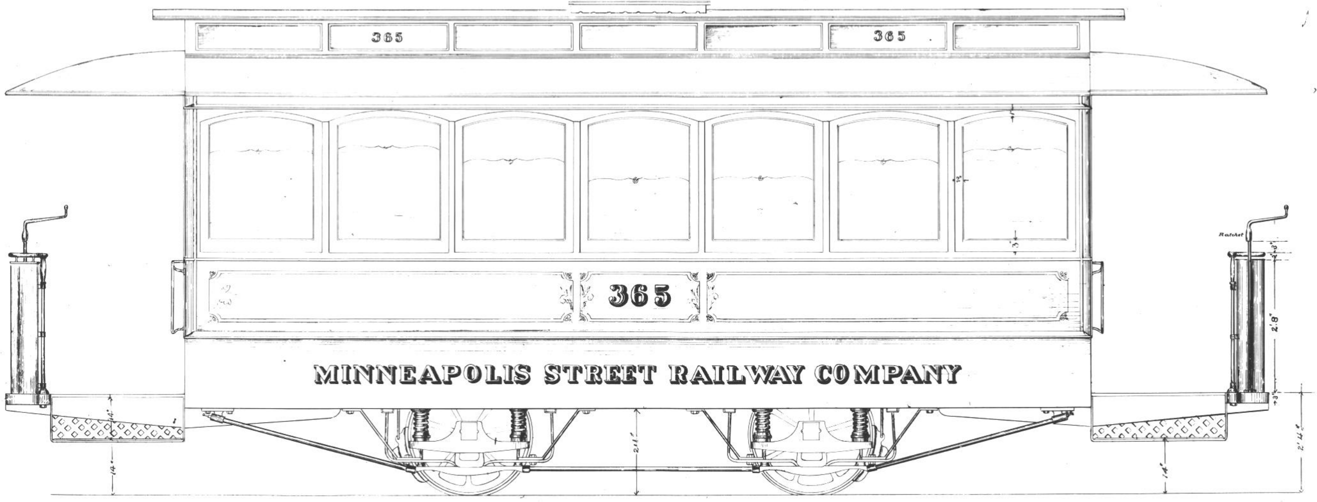

Roof Carline
Roof Carline
Roof Carline
2'7"
5'4"
7'2"

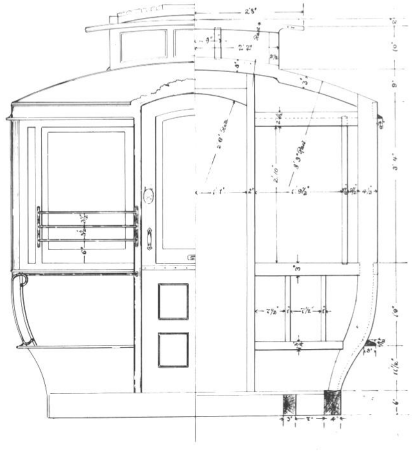
Roofing Plan


1'9"
16"
10½
2"
Grooved for drainage as shown on elevation

TROLLEY BRIDGE

Note Trolley bridge to be on motor car only, and to run entire length of Car


365
365
365
MINNEAPOLIS STREET RAILWAY COMPANY
Ratchet
2'8"
2'1"
14"



HALF OF END ELEVATION. FRAMING OF END

Length of Body 18'7"
Lenth over all 26'7"
Width of Body 7'6"
Width of Base 6'0"
Wheel Base 7'6"

Minneapolis Street Railway Co.

PLAN, ELEVATION & SECTION OF

SCALE – 1 INCH = 1 FOOT

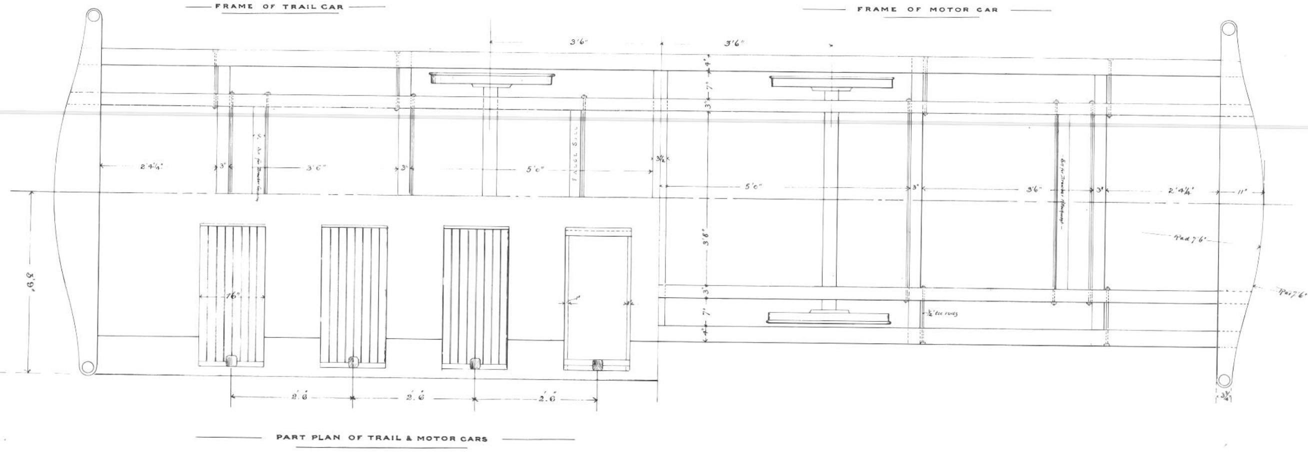
Closed Car

Minneapolis, Minn. Jan 3rd 1891 W. F. Carr Engineer

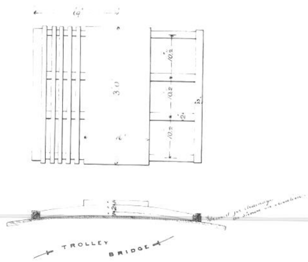
No. 10

339

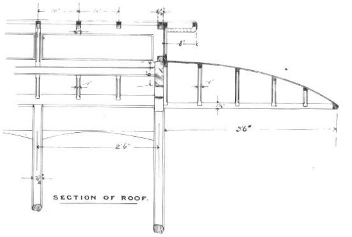
2-6129


FRAME OF TRAIL CAR
FRAME OF MOTOR CAR
3'6"
3'6"
2'4½"
3'6"
5'6"
5'6"
3'6"
2'4½"
11"
3'8"
5'8"
16"
2'6"
2'6"
2'6"

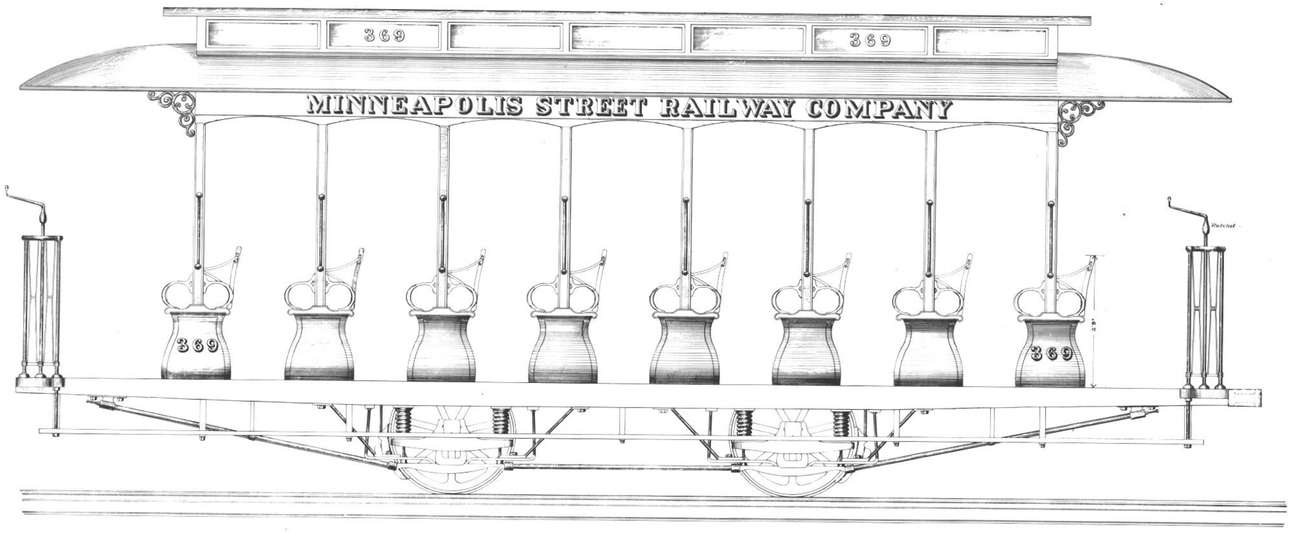
PART PLAN OF TRAIL & MOTOR CARS



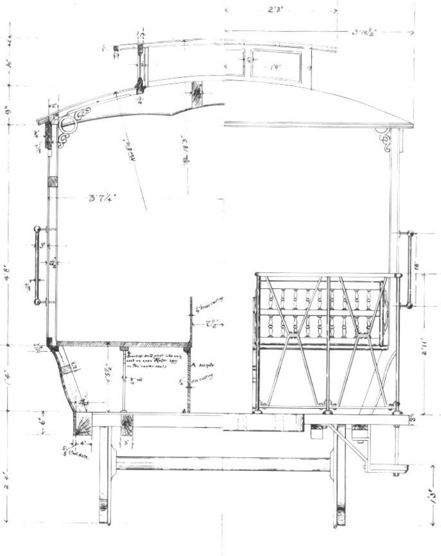
TROLLEY BRIDGE



SECTION OF ROOF


369
369
MINNEAPOLIS STREET RAILWAY COMPANY
369
369

Length of Car, out to out 24'10"



HALF OF CROSS SECTION — HALF OF END ELEVATION.

Minneapolis Street Railway Co.

PLANS, ELEVATIONS & SECTIONS OF

SCALE 1 INCH = 1 FOOT.

SUMMER CARS.

Minneapolis, Minn. Feb 22nd 1890 Engineer.

334

A – Note – Iron standard under two center seats on motor cars
to be hinged and catches provided at c and d to hold in position
for purpose of lifting trap doors to get at Motors.

2-6135

1891

20 cars: #423-#442, 24 ft. 8-bench open, deck roof, single truck motor cars built by the Robinson & Moan Car Co. The mech. dept. record cards carry a date of 3-3-1891 on these cars. The motors were removed in December 1891 and placed in new cars #503-#522. Thereafter these open cars were always used as trailers.

2 single-truck sprinkler trailers built during the spring in the 3rd Ave. N. shops. Each was equipped with a rectangular 6' x 12' boiler-iron tank, capacity 90 barrels of water, mounted on a flat car. The Bemis single truck was fitted with a wood pilot. A fixed spray bar was mounted on each platform for sprinkling the track. A projecting swing arm mounted on the platform of the "B" end of the "gate side" supported a wing spray bar for sprinkling the adjacent roadway. The photograph does not indicate if there also was a wing spray bar on the platform of the "A" end of the "pole side" (that is, a double end car). Apparently gravity feed. They were to be pulled by passenger motor cars at a good speed to control the dust between tracks and on the roadway. An article in a July 1891 issue of the Street Railway Journal reported them nearing completion. Another July 1891 article reported that a number of street sprinklers had been arranged on motor cars to be operated on University Ave. between Minneapolis and St.Paul. Apparently the sprinkler trailers were never used. They do not appear on Frank Trumbull's inspection report of 1-18-1893.

60 cars: #443-#502, 18 ft. closed, deck roof, single truck motor cars built by the J. M. Jones' Sons Car Co. The mech. dept. record cards carry a date of 8-4-1891 on these cars. They were assigned to the Washington Ave., 1st Ave. So., and Hennepin Ave. lines.

20 cars: #503-#522, 18 ft. closed, deck roof, single truck motor cars built by the Northern Car Company, Robbinsdale, Minn. The mech. dept. record cards carry a date of 7-30-1891 on these cars. They were received during September 1891.

One closed single-truck motor car was destroyed by fire in April because of a faulty roof insulator.

An article in a May 1891 issue of the Street Railway Journal reported that 120 cars had been ordered for Minneapolis and St.Paul.
 20 cars from Northern Car Company;
 60 cars from J. M. Jones' Sons Car Company; and
 40 cars from John Stephenson Company.
The Stephenson-built cars were for St.Paul. It appears that the Northern and Stephenson orders were subsequently changed to 36 cars each.

16 cars: #523-#538, 18 ft. closed, deck roof, single-truck motor cars. The mech. dept. record cards carry a date of 7-30-1891 on these cars, the same date as on #503-#522. These 16 cars were painted yellow with cherry interior finish. Northern Car Co. was to deliver 14 cars during December 1891.

An article in a July 1891 issue of the Street Railway Journal reported that Mpls. St. Ry. had 110 cars equipped with Edison (Sprague) motors.
 40 on Jones 16 ft. closed cars [#263-#302, converted horsecars];
 60 on LaClede 18 ft. closed cars [#363-#422]; and
 10 on LaCledde 24 ft. open cars [#303-#362 series].

An article in a September 1891 issue of the Street Railway Journal reported the following. The number of cars in daily operation, of course, changes according to the exigencies of the traffic, but a fair average may be taken as about 130 cars in St.Paul and about 250 in Minneapolis. These cars are from the shops of various makers, Jones, LaClede Car Co. and Northern Car Co. being largely represented. Bemis trucks are used throughout the system. All the closed cars are of one standard length, eighteen feet seven inches, and in Minneapolis, are all painted canary yellow with white trimmings, the different lines being distinguished by signs on the roofs. In St.Paul the various lines are designated in the same manner, the prevailing color in this instance being a rich green.

1 car, Supply Car #1, was built during December 1891 in the 3rd Ave. No. shops under the direction of ~~Thomas~~ William Driscoll, master mechanic. This was a 24 ft. single-truck car, equipped with two Thomson-Houston SRG motors. Body design features were a low arch roof, open platforms, very wide. End doors the full width of the car on each end, and rails laid on the car floor full length accommodated wheel and axle sets; portable inclined approach ramps were used, both the brake staff and control stand on the platform could be removed to give free access to either end of the car. A moveable armature rack was included as well as shelving on both interior sides.

During December 1891 car #284 was experimentally rebuilt in the 3rd Ave. No. shops. The 16 ft. five-window body was cut in two and 6 ft. of new car body spliced into the gap to produce a 22 ft. eight-window body. Overall length was approximately 30 ft. This car had two Thomson-Houston 15 h.p. motors, plate glass mirrors on each interior end, interior painted blue and gold with upholstered seats in warm crimson, and two brass chandeliers with three incandescent globes in each. The exterior was painted "standard orange". The rebuilt car proved satisfactory and MSR announced that the other 39 cars in the series (#263-#302) would be similarly rebuilt.

1892

A February magazine article reported that Northern Car Co. was to rebuild 30 Jones "bobtails" to 30 ft. length [overall]. Another February magazine article reported that 90 cars had been ordered for both Minneapolis and St.Paul systems.

The first double-truck car to operate in the Twin Cities was one built by Northern Car Co. for the Northwest Thomson-Houston Co. who wished to demonstrate to TCRT officials the advantages of such cars. This was a 35 ft. vestibuled, closed motor car with railroad roof, seating 40 persons. It was equipped with two maximum traction trucks and two Thomson-Houston W.P. 50 motors (25 h.p. each). Test trips were operated on the "Interurban" line during May 1892 with satisfactory results. (Northern Car Co. built five identical cars for the Riverside Park Line at Sioux City, Iowa.) This car was not included in Frank Trumbull's inspection report of 1-18-1893. It eventually was purchased and appears to have been #540 in the SPCR number series.

Thirty 36 ft. 12-bench open, double-truck motor cars were ordered from Northern Car Co.; sixteen cars were to be new, #539-#554, and fourteen cars, #555-#568, ex "Motor Line" open trailers converted to motor cars, repaired and repainted. They were intended for summer use on the "Interurban" line and on the "Lake Harriet" line in Minneapolis. Short Gearless Motors were to be used. The Northern Car Co. plant was destroyed by fire May 15, 1892, along with "a number of unfinished cars for St.Paul". June 1892 magazine articles reported: (1) cars entered service on the "Interurban" line with Thomson-Houston W.P. 50 motors; and (2) eleven cars [probably #540-#547,#549-#551] were delivered during June with Bemis Patent trucks on 24 ft. centers equipped with Thomson-Houston W.P. 50 motors. All the cars were painted "a brilliant orange". Of the newly-built cars apparently only #552-#554 were destroyed in the Northern Car Co. fire. #539 was either sold to or given to the Milwaukee St. Ry., owned by Henry Villard, by Thomas Lowry. #548 was either sold to or given to the Highland Improvement Co., Duluth, by Thomas Lowry. The final results were as follows.

11 cars: #540-#547,#549-#551, 36 ft. 12-bench open, double-truck motor cars equipped with Bemis M.T. [29] trucks and two Thomson-Houston W.P. 50 motors. The mech. dept. record cards carry a date of 4-15-1892 on these cars; their data sheet carries a date of 5-15-1892.

14 cars: #555-#568, 36 ft. open, double-truck motor cars. A June periodical reported (1) that #557 was old "Motor Line" #65 repainted brilliant orange, with steps provided on one side only, the opposite side enclosed by a screen; and (2) they were equipped with two 5'2" wheelbase trucks (33" diameter wheels) and two 25 h.p. motors.

Apparently the fire which destroyed the Northern Car Co. facility occurred before work could be started on lengthening the 30 Jones "bobtails". Instead the rebuilding was performed by MSR in the 3rd Ave. No. shops. Thirty-eight cars were actually rebuilt. Apparently the one car destroyed by fire caused by a faulty roof insulator was from this group. #284 was the prototype experimental car. The 38 newly-rebuilt cars had 22 ft. bodies (30 ft. overall) and all were re-numbered to #569-#606. They were assigned to the 1st Ave. So. and north side lines.

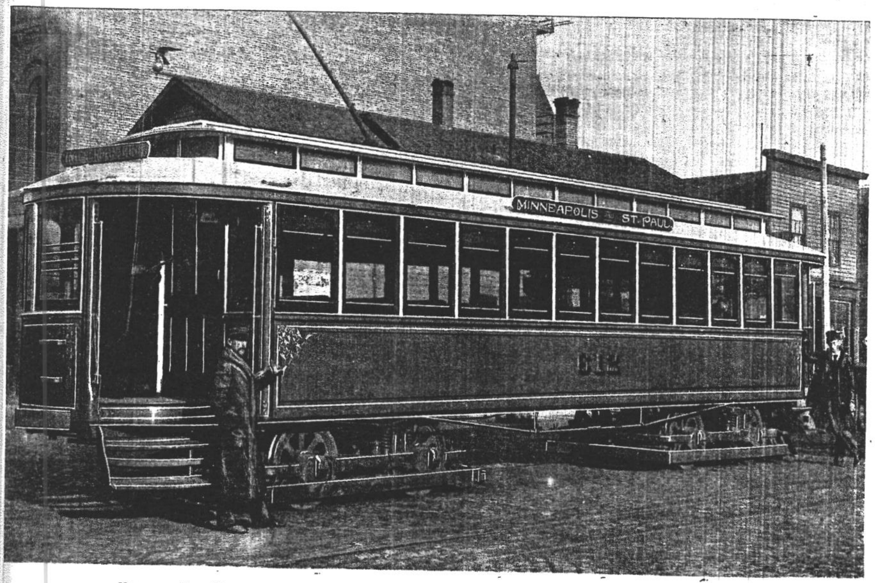
TCRT was not satisfied with most of the cars previously acquired and felt they were wholly inadequate for the service required. TCRT did consider the Northern Car Company-built single-truck closed motor cars the best they had ever used. The Northwest Thomson-Houston Northern-built double-truck vestibuled car had been tested during May 1892 on the "Interurban" line with satisfactory results. However the Northern Car Co. plant was destroyed by fire May 7, 1892, so another carbuilder had to be found. A contemporary article reported that TCRT had negotiated with various carbuilders for construction of a car that would be large and strong enough. After numerous trials, all of which failed, a contract was entered into with American Car Company, St.Louis, for 20 cars to be built from a design, plans and specifications furnished by TCRT. TCRT vice president Calvin Goodrich performed the design work. William Sutton, president, and Emil Alexander, secretary, had founded the LaClede Car Company but left LaClede in 1891 and formed the American Car Company.

20 cars: #607-#626, American Car Company; the mech. dept. record cards carry a date of 7-9-1892 on these cars. As received from the builder they were of wood construction, 42'6" long and 8'9" wide. Two Bemis M.T. [29] trucks were fitted with wood side guards and attached wood front pilot (as on the Northern Car Co.-built open motor cars #540-#551.) Two Thomson-Houston W.P. 50 motors (25 h.p. each) with TCRT series-multiple rheostat control (drawing dated May 1892). Spear hot air heater located in the carbody proper. All cross seats, seating 43 persons. Front and rear exits, no gates. Total weight 31,000 pounds. A contemporary article in the Street Railway Journal provided additional information. "Finished in cherry with a handsomely ornamented birds-eye maple ceiling. Enclosed motorman's cab with unobstructed vision on all sides. An aisle and doorway for access to the car from the front end passed on one side of the cab; the door was manipulated by a lever from the rear platform. Spear type heater in the motorman's cab (sic) with hot air passages to registers under the seats. Hale & Kilburn seats. Lighted by 10 lamps in alternate circuits. Equipped with storm windows in winter with the front entrance temporarily closed." The Frank Trumbull inspection report of 1-18-1893 listed them as 41 ft. vestibuled cars; the full carbody was 41' 0" long with front and rear buffing timbers of 9" each made the overall length 42'6". A somewhat later report stated that while commodious and comfortable, the cars were found to be weak in construction, and were constantly in the shops for repairs.

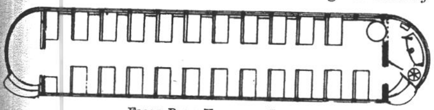
A New Era in Street Car Building.

The Minneapolis and St. Paul Street Railway Company, or more properly speaking, The Twin City Rapid Transit Company, has for some time enjoyed the reputation of being head and foremost in all matters pertaining to electric street railway. They probably utilize, develop and put into practical use more new and improved electrical appliances than any other company in existence. One of their latest efforts to add to the comfort of their patrons has been the purchase of the new vestibule cars just completed by the American Car Company of St. Louis, for the Interurban line.

These cars are forty-two feet long, finished in cherry, with handsomely ornamented birds-eye maple ceilings; seat forty-three passengers, with standing room for forty more; the motorneer is at the front end, enclosed in a cab or observatory, having unobstructed vision on all sides; the aisle and doorway for access to car from front end pass on one side of this cab, this door being manipulated by a lever from the back platform; the car is heated by a standard railway heater of the Spear type, the stove proper being in the motorneer's cab, the heat being conveyed to interior to car through hot air passages, having registers under each seat. The seats are similar to those used on regular railway coaches, of the well known Hale & Kilburn make, having spring seats and backs covered with cane, frames of cherry, and trimmings of bronze highly polished; the cars are lighted by ten single electric lights, arranged in alternate circuit, and mounted on double trucks. These trucks are the same as used under the open cars on same line, each carrying a Thompson-Houston 25 horse power motor or 50 horse power to each car. They have been thoroughly overhauled, however, and a solid wheel with a steel tire will hereafter be used.



VESTIBULE CAR, MINNEAPOLIS AND ST. PAUL INTERURBAN LINE. (Built by American Car Company, St. Louis.)



FLOOR PLAN, VESTIBULE CAR.

In mounting the new car bodies on the trucks they have been given a center bearing similar to that of a railroad car which gives them the same advantage of the easy rolling motion. The starting and stopping is also done without jerking, the current being perfectly handled by a series multiple controller, a new device recently gotten up by the company. Everything in fact is done in a manner far in advance of previous efforts in the street car line.

These cars were designed by Mr. Goodrich, the vice-president of the company, and it seems perfectly natural that one of the chiefs of the greatest electric street railway company in the country should turn to St. Louis, the city that builds more street cars than all other cities combined, and to the American Car Company, the largest and best equipped company in St. Louis, to carry out his plans and ideas.

This they have done in every detail, making for themselves the best possible record as builders of street cars that are far in advance of the usual order, and giving to the patrons of the Minneapolis and St. Paul Interurban line one of the most complete and finest looking electric street cars now in use.

ARTICLE: "A new era in street car building"
SOURCE: Street Railway and Electrical News
VOL/ISS: v3 n11, November, 1892
PAGING: p 167

607-626

Length

Car Body	32'6"
Platforms	4'3" plus 9" buffing timber
Overall	42'6"

TCRT Series-Multiple Rheostat
Drawing G5 #11 dated May 1892

AVERY® PV119ED

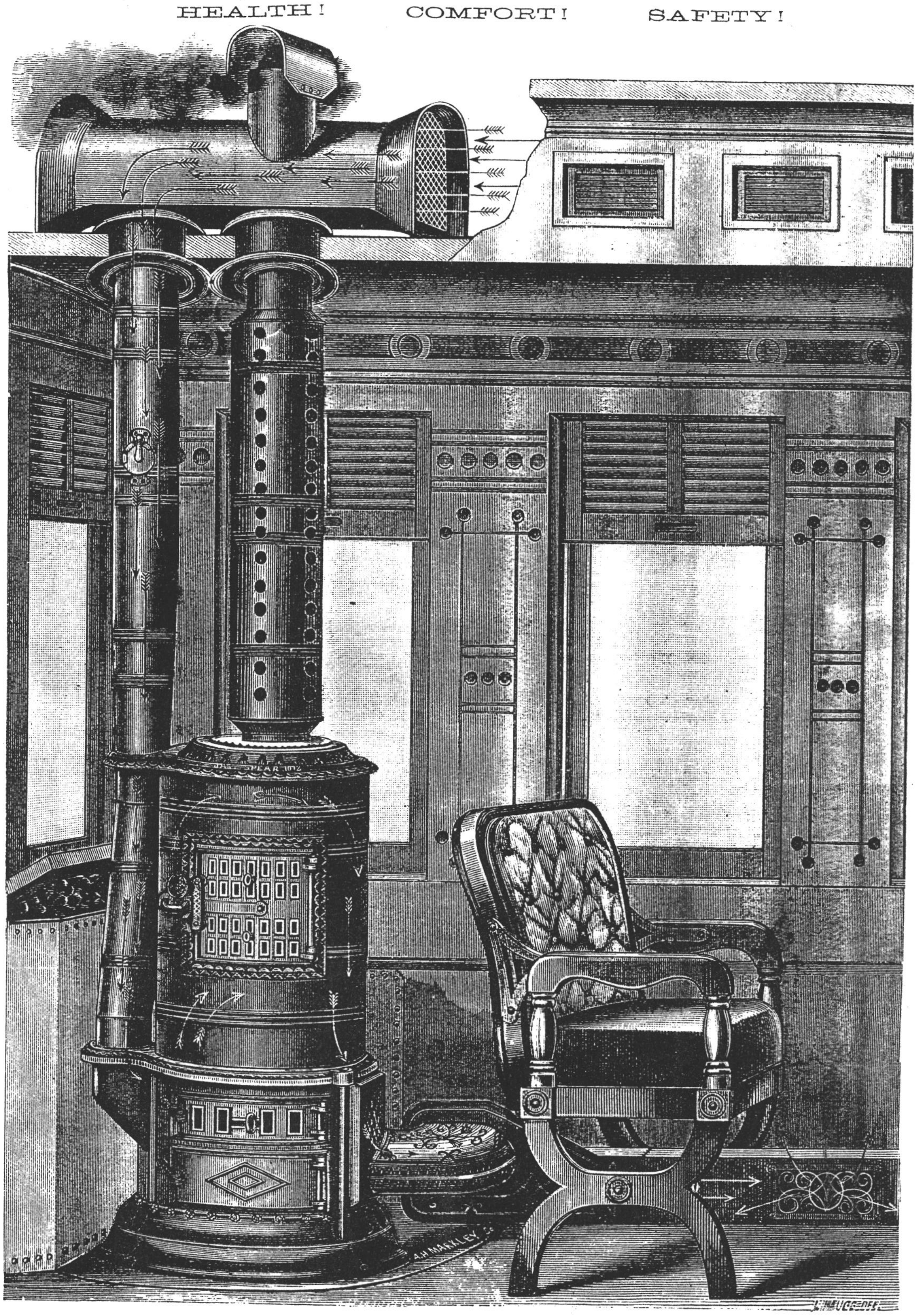

HEALTH! COMFORT! SAFETY!
A.H. MARKLEY Sc.

Figure 5.21 James Spear manufactured a popular style of hot-air stove based on his patent of 1857. (National Car Builder, *October 1881*)

ST.PAUL CITY RY.
ORIGINAL ELECTRIC CARS
1890-1892

1890

The first electric line on Grand Avenue, opened February 22nd with seven trains of two cars each, a motor and a trailer. The first train over the line consisted of motor car #169, converted from an 18 ft. 6-bench open cable grip car, and closed ex-cable trailer #136. The 1890 U.S. Census (7-1-1890) reported 9 electric motor cars and 9 trailers. The Frank Trumbull inspection report of 1-18-1893 indicates all 9 motor cars were converted open cable grip cars. Later in 1890 four motor cars were reported in operation. July: Grand Ave. cars are open cars with barred sides and entrance/exit on either end on account of the danger to passengers of the center overhead poles.

March 28th: contracted for 80 "double motors" [two 15 h.p. motors for each of 80 cars] from the Sprague Electric Railway & Motor Company.

March: Thomson-Houston Company to equip 15 cars for the "Interurban" line.

Most of the latest 14 ft. closed horsecars were converted for electric operation.

A four-wheel double-end Snow Sweeper was designed by George Larkin, chief engineer, and built in the SPCR shops. It was powered with one 30 h.p. motor connected by sprockets and chain to the axles and controlled by a rheostat mounted below the car floor. One Columbia 10 h.p. motor was used to drive each broom, one rheostat controlling both motors, with connection to the brooms by chain and sprockets (direct drive). See complete description and photograph appended.

1891

A February magazine article stated that about 50 motor cars were in use in St.Paul:
  17 on the "Interurban" line with Edison (Sprague) motors;
  8 on the "W. 7th St." line with Thomson-Houston motors;
  10 on the "Grand Ave." line with Edison motors;
  10 on the "Rice St." line with Edison motors; and
  5 extra cars (type of motors not reported).
Most, if not all, were probably converted 14 ft. closed horsecars.

No specific references to the first order of new electric motor cars from a commercial carbuilder have been located other than a February article reporting that new 18 ft. cars were being received for the "Interurban" line. TCRT records as of 9-1-1904 indicate some duplication of numbers due to the separate numbering systems; it appears from these records that at least the following new cars were received.

42 cars: #328-#369, 18 ft. closed, deck roof, single-truck motor cars built by LaClede Car Company. The mech. dept. record cards carry dates of 2-1891 and 2-20-1891 on these cars. This number series follows the closed cable trailers and thus duplicates most of the numbers assigned to the concurrent Mpls. St. Ry. orders for 60 open and 60 closed motor cars.

An article in a May 1891 issue of the Street Railway Journal reported that 120 cars had been ordered for Minneapolis and St.Paul.
  20 cars from the Northern Car Company;
  60 cars from J. M. Jones' Sons Car Company; and

40 cars from John Stephenson Company.
The Stephenson-built cars were for St.Paul. It appears that the Northern and Stephenson orders were subsequently changed to 36 cars each.

Company records with regard to the Stephenson order are incomplete. In addition a newspaper article reported that the SPCR management was responsible for a mistake in car numbering in that a recent order of cars for St.Paul had arrived bearing numbers consecutive (sic) with the latest Minneapolis cars. The two systems at this time were supposed to be kept distinctly separate as far as cars were concerned.

25 cars: #503-#527, 18 ft. closed, bombay roof, single-truck motor cars built by the John Stephenson Company. The mech. dept. record cards carry a date of May 1891 for these cars.

11 cars: #529-#539, 18 ft. closed, bombay roof, single-truck motor cars built by the John Stephenson Company. The mech. dept. record cars also carry a date of May 1891 on these cars, although they were received much later than the first 25 cars; see #528 following under 1892.

A September 1891 issue of the Street Railway Journal reported "The number of cars in daily operation, of course, changes according to the exigencies of the traffic, but a fair average may be taken as about 130 cars in St.Paul, and about 250 in Minneapolis. These cars are from the shops of various makers, Jones, LaClede Car Co., and Northern Car Co. being largely represented. Bemis trucks are used throughout the system. All the closed cars are of one standard length, eighteen feet seven inches, and, in Minneapolis, are all painted canary yellow with white trimmings, the different lines being distinguished by signs on the roofs. In St.Paul the various lines are designated in the same manner, the prevailing color in this instance being a rich green."

1892

#528: a February 1892 magazine article reported that Northern Car Company was to build 68 cars to 22 ft. length; this refers to the 38 cars for Minneapolis (Jones "bobtails") previously described, and 30 cars for St.Paul. A February 1892 issue of the Street Railway Journal stated that the first rebuilt 22 ft. closed car turned out of Northern Car Co. shops was made from joining two Stephenson horsecars from St.Paul; a local periodical said this was car #528, the first new remodeled car after Mpls. St. Ry. #284 had been tested.

#540: it appears this number was reserved for the 35 ft. vestibuled closed motor car built by Northern Car Co. for the Northwest Thomson-Houston Company previously described. We know it was painted the SPCR green in the mid 1890's. However it does not appear in Frank Trumbull's inspection report of 1-18-1893.

29 cars: #541-#569, 22 ft. closed, single-truck motor cars rebuilt from 14 ft. closed motor cars converted from horsecars, originally built by John Stephenson Co. and Brownell & Wight. The cars were renumbered in the course of rebuilding, all of which apparently was performed by Northern Car Co. The sole remaining mech. dept. record cards pertain only to #567-#569 listing them as rebuilt June 1892 from Brownell & Wight cars; the length is given as 18 ft. which probably is in error.

A local publication dated July 1892 reported that old "bobtail" horsecars were being rebuilt to Salters, and that MSR and SPCR combined had about 40 such cars. In addition several Snow Plows had been purchased.

MINNEAPOLIS STREET RAILWAY HORSECARS
Compiled from Minneapolis Tribune articles

7-10-1875: Orders have already gone forward for six first-class cars.

7-18-1875: Mr. Hathaway, superintendent, reported that two new cars have already been shipped to this destination.

9-22-1875: Two of the new horsecars are expected to arrive today.

12-31-1875: Ten horsecars owned.

7-8-1876: Four new cars have arrived for the Hennepin Ave. and Twelfth St. line.

9-9-1876: Runs 14 cars that on average cost $850 each. 16 drivers are employed at a salary of $40 per month.

1-2-1877: 16 cars, 70 horses, 40 employees. Monthly payroll $1500.

1-2-1878: Had 17 cars and 65 horses per 10-11-1879 interview with Supt. Atwood.

8-5-1878: Decided to purchase four new cars of the Jones make, the finest in the land, manufactured at Troy, N.Y., for the new line. [Extension of 4th Ave. S. line] (7-10-1878: with this extension MSR will own and operate 11 miles of road, 22 cars and about 100 horses. [Thus 18 cars at present.]

8-29-1878: Car #6 was turned out for business this morning from the stables as bright as a dollar; good as new and a great deal handsome. Work was done by George R. Peck. Same style as other cars on that line [not named] but of much finer finish.

9-14-1878: The four new cars for the 4th Ave. S. line will be on hand about October 1st. The street railway is repainting the Washington Ave. line cars in red.

9-18-1878: The street railway has turned out a car for the Washington Ave. line that is most striking. Body is painted a brilliant scarlet with white trimmings, lettered and striped with gold. The newly painted red cars on the 4th Ave. S. [sic] line were put on yesterday.

9-25-1878: Four new elegant cars built in Troy, N.Y. will be shipped this week and arrive in about ten days.

11-5-1878: From the article "The Street Railway" in Notebook 2A, during the year: "increased the equipment to 15 cars; added 25 horses" [sic].

10-11-1879: We now have 21 cars and 95 horses. Life of a car is 8 to 15 years.

7-14-1880: Four new cars from the Jones & Sons Co. of Schenectady, N.Y., arrived yesterday. They are of the same pattern as the Fourth Avenue cars with the exception that the windows are wider and one less in number on each side. The panels are painted blue with white trimming; cars are lettered "University and Hennepin Avenues". Six more cars from the same plant are on the way, which when they arrive will make a total of 31 cars owned and operated. The four cars went into service 7-17/18-1880. The old cars will be used on the Cedar Avenue route. 8-6-1880: two more of the new streetcars arrived yesterday and were placed on the track. They are for the "Hennepin Ave. & University" line. 8-12-1880: two more of the new cars arrived yesterday on the Chicago Milwaukee & St.Paul Railway.

3-21-1881: 25 new cars now being made by J. M. Jones & Co., Schenectady, N.Y. 100 horses being purchased. 4-19-1881: 11 new cars of very handsome design and finish have just arrived.

6-24-1881: Another lot of cars for the Riverside Avenue line were received yesterday.

10-16-1881: Proposed purchase of 30 new cars and 100 horses to be distributed over the lines where most needed. There will be 86 cars and 400 first-class horses to pull them.

1-1-1882: Present equipment includes 54 cars and 265 horses. 20 cars of improved construction and elaborate finish have been ordered and it is probable that 25 more will be needed.

12-23-1882: A large number of additional cars ordered are now in the course of construction, to be delivered next April.

1-1-1883: Twenty cars and 120 horses were purchased during the [past]year. [However, Expenditures for permanent improvements during the past year included:] Thirty new cars $54,000. The business of the coming year will require the purchase of 39 new cars which have been ordered.

5-2-1883: In the matter of handsomely and richly furnished cars the last installment put on the Hennepin Ave. & University line far excel anything heretofore in use by this company. These new cars were built by the J.G. Brill Company of Philadelphia, are some trifle wider than the older patterns, are supplied with very handsome center lights instead of the dingy "bull's eye" at the end, are richly furnished and trimmed with mahogany, and are easier riding than anything ever seen on the tracks of the company. 6-26-

1883: the new 6th St. cars are out signed "Sixth Street, Grand Opera and Hennepin Avenue".

11-10-1883: Operates 35 miles of track and 105 cars, 61 of which are in constant use during the day, beside which extra cars are run nights and mornings on four lines.

12-31-1883: Operates 31 miles of track and 105 cars, 62 of which are employed daily, employs 350 men and 435 horses.

3-8-1884: Twenty large new cars have been received and will be put on the Fourth Ave. S. service where the demands are very great and rapidly increasing. The new cars are fourteen feet long, and the handsomest ever brought to the city. The experiment of using mules will be tried on these new cars, and 104 mules have been received. The new cars will not be used for some time, or at least until the weather becomes more moderate.

5-2-1886: The company here [3rd Ave. N. & 2nd St. N.] has facilities for manufacturing cars, but as yet has confined itself to rebuilding and repairing. A number of cars destined for Duluth were in various stages of repair and several completed appeared quite equal to new ones

7-19-1887: figures quoted for 1-1-1887: 51 miles of track, 125 cars in use.

6-24-1887: City council passed an ordinance requiring conductors on all cars within 30 days.
7-30-1887: Supt. Goodrich said yesterday: "We are pushing this matter as fast as we can. The platforms must be changed entirely; the guarded platform of the driver must be taken off and made the same size as the rear one, which will have to enlarged materially to admit of the conductors standing thereon; the roofs of all the cars must be accommodated to these several changes, and the register in each car will have to be arranged so that it can be rung from either end of the car. We can not tell definitely when these changes will be completed. We have all of our necessary carpenter work finished, and the roof, platforms, etc. are all ready for the painters. The Fourth Ave., Plymouth, and the University lines will be the first to be transformed, they being our heavy runs."

4-12-1889: 90 cars in base service, 117 cars in a.m. and p.m. rush hours. Cars #39 and #76 mentioned in service. 4-21-1889: Two cars overturned by strikers on Riverside Ave. line; #126 and #134.

MINNEAPOLIS ST. RY. HORSECARS
Compiled from Street Railway Journal articles

January 1885: MSR is having built by the John Stephenson Co. and Brownell & Wight 30 16ft cars, to be equipped with Small's automatic fare collector. The company now has the collector on 20 cars.

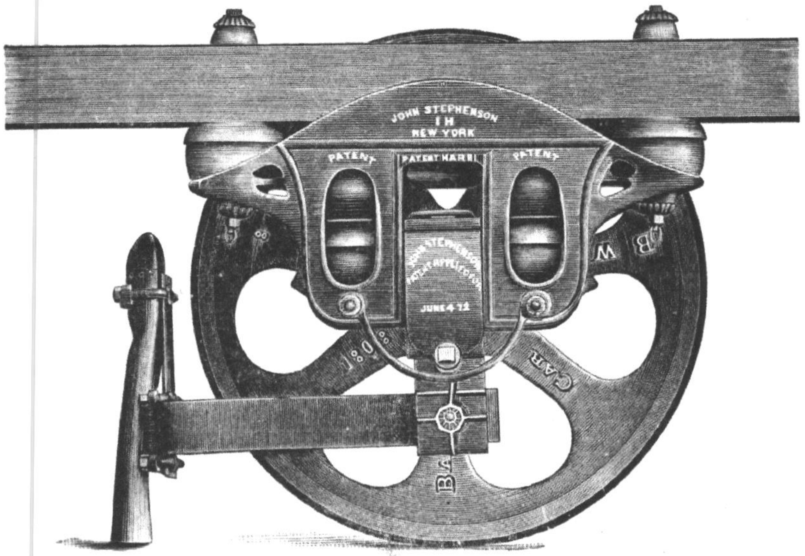
May 1885: MSR is having built by the John Stepehson Co. 16 new cars, 16ft. long, all to be equipped with Small's automatic fare collectors.

June 1885: Brownell & Wight Car Co. have recently shipped to MSR some of the most elegantly furnished streetcars now in service. The interior finish is mahogany and other choice woods, relieved by beveled plate glass mirrors.

December 1885: Lewis & Fowler Mfg. Co. has received orders from MSR and SPCR for fare collectors and to equip the cars of the entire lines. This is after a trial for 15 months on 75 14ft and 16ft cars of automatic fare collectors.

May 1886: MSR will build 10 miles of track, 40 cars, and add 350 horses to their equipment, all to cost over $175,000.

October 1891: The last MSR horsecar disappeared in June.



THE STEPHENSON RUNNING GEAR FOR STREET CARS. 12-1886

AVERY® POLY VU

Minneapolis St. Ry.Horse Cars

Speculation on Mpls. Tribune and St. Ry. Journal Articles

7-10-1875	6 new cars	Jones Sons Co.?	10 ft. Closed	#1-6
Dec 1875	4 cars	New? Used?	10 ft. Closed	#7-10
12-31-1875	10 cars			
7-8-1876	4 cars		10 ft. Closed	#11-14
9-9-1876	14 cars			
1876	2 cars		10 ft. Closed	#15-16
1-2-1877	16 cars			
1877	1 car		10 ft. Closed	#17
1-2-1878	17 cars (per Supt. Atwood)			
9-25-1878	4 cars	Jones	10 ft. Closed	#18-21
10-11-1879	21 cars			
7-14-1880	10 cars	Jones	12 ft. Closed	#22-31 (slightly different)
	31 cars			
3-21-1881	25 cars	Jones	12 ft. Closed	#32-56
	56 cars			
Summer 1881	(2 cars?) sold to a city somewhere in Missouri			
1-1-1882	54 cars			

From here on it is difficult to accurately track cars owned as articles often refer to cars in service rather than cars owned, and older cars were gradually being disposed of. There are some discrepancies in quantities reported in some articles. Following are my interpretations.

10-16-1881 proposed ordering 30 cars; 1-1-1882 ordered 20 cars. 1-1-1883 received 20 cars during year; paid for 30 new cars $54,000 Cost appears reasonable for 30 cars plus horses

1882 assume	30 cars		12 ft. Closed	#57-86
(1-1-1883 39 cars have been ordered.)				
5-2-1883	25 cars	J. G. Brill	12 ft. Closed	#87-111
3-8-1884	25 cars	Brownell 2-1-1884	14 ft. Closed	#112-136
Jan 1885	30 cars		16 ft. Closed	
May 1885	Stephenson	16 cars		#137-152
June 1885	Brownell	14 cars		#153-166
1886	28 cars	Pullman	16 ft. Closed	#167-194
1887	6 cars	Pullman	16ft. Closed	#195-200

7-30-1887: Note the rebuilding of both front and rear platforms on cars where conductors were being added.

11-1877, 2-1881: Note that snow plows, scrapers, salters and sanders were horse-drawn.

Closed Horsecars Summary

10 ft.	21 cars	1875-1878	#1-21
12 ft.	90 cars	1880-1883	#22-111
14 ft.	25 cars	1884	#112-136
16 ft.	64 cars	1885-1887	#137-200
Total	200 cars		

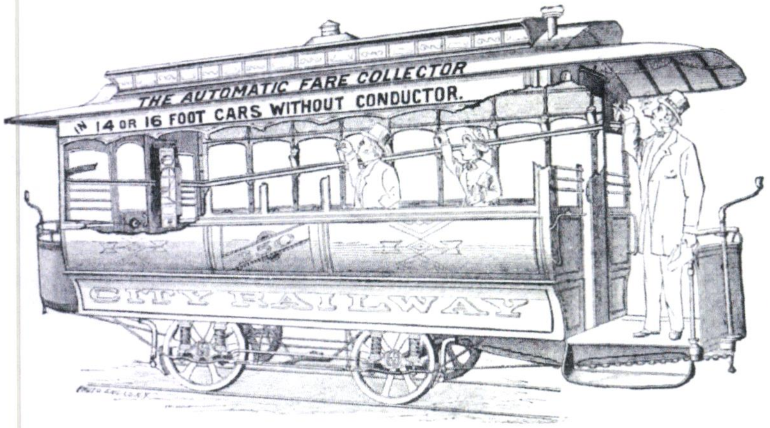
THE STREET RAILWAY JOURNAL

VOL. I. {NEW YORK: 32 Liberty Street.} JANUARY: 1885 {CHICAGO: 8 Lakeside Building.} No. 3.

Small's Automatic Fare-Collector.

This device,* intended for fare box cars, consists of a flat brass channel about an inch wide and one-quarter inch thick, placed on its edge, and running from the rear to the front end of the car at a slight inclination, and terminating in the money box. The tube is so constructed that the money or disk-shaped checks dropped into it are kept in sight, roll readily, and cannot be extracted until they are taken out of the locked box. Whatever is placed in it is visible to all who may be in the car. The ways, or "collectors," pass from the rear platform along each side of and around the corners of the car into the money box. The money passes into the collectors through boxes placed on each stanchion of the car, so that the passenger is enabled to pay the fare without leaving the place where he may be sitting or standing In New York, Baltimore, Minneapolis, Louisville and other places where this system is in operation, we learn that the regular patrons of the cars make it a point to come provided with the exact fare, to save themselves the trouble and annoyance of going to the front end of the car to deposit the fare, or of asking others to do so for them, thus relieving the driver to a great extent from the troublesome and dangerous duty of making change. Hard rubber or celluloid checks are substituted for paper where tickets are used. They claim it to be more secure from counterfeiting, and eventually much cheaper than paper tickets.

By the use of such "Automatic Collectors" cars sixteen feet in length can be operated by one man at least as easily as those of ten feet under the old money box system. Several open cars equipped with this invention have been running for the last three summers, on the One Hundred and Twenty-fifth Street branch of the Third Avenue Line, New York. They were managed entirely by the driver, and frequently carried over fifty passengers at a time, the fares being paid and collected without the least inconvenience or trouble. On account of the difficulty of getting to the fare box it would hardly be possible to work these cars without a conductor, were it not for the "automatic fare collector." This system makes the open car entirely practicable without the aid of a conductor.

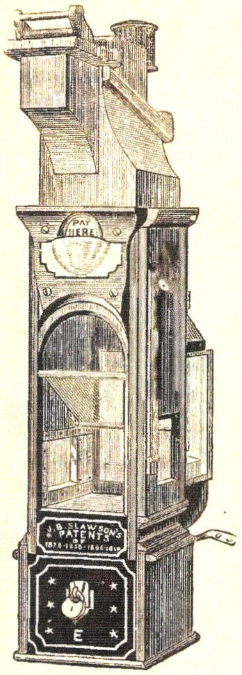

THE AUTOMATIC FARE COLLECTOR
IN 14 OR 16 FOOT CARS WITHOUT CONDUCTOR.
CITY RAILWAY

---

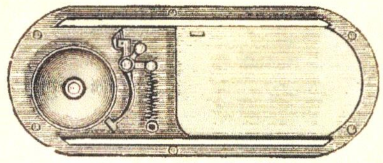
* Lewis & Fowler M'f'g. Co., 8 Columbia Heights, Brooklyn, N.Y.

SEP 1887

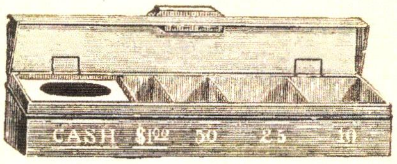
Slawson's Patent Fare Boxes, etc.


PAY HERE
J. B. SLAWSON'S PATENTS
E

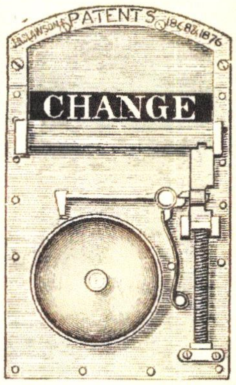
E. Omnibus Fare Box.



Change Slide. Inside.


CASH $1.00 50 25 10

Driver's Change Box.


J.B. SLAWSON'S PATENTS 1868 & 1876
CHANGE

Change Gate. Inside.

Boxes marked A and B are of the old style, and are now unsalable.

Box marked E is adapted for omnibus use, and is arranged for outside passengers to pay, as well as those inside. Said Boxes are of the latest and most approved patterns, and contain a front door, by opening which all of the glass inside can be conveniently cleaned. This is a late patent, and is a very valuable improvement over the old method of taking the boxes apart for that purpose. They are well made and not liable to get out of order, cannot possibly be picked, and even if all the glass is broken no fare can be extracted from the drawer.

The late J. B. SLAWSON originated the "FARE BOX SYSTEM," and all of said Boxes, Change Gates, and Drivers' Change Box are protected by several patents, and parties using them are not liable to claims for infringements, as may be the case with some boxes which are now being offered for sale.

These Boxes, etc., are now in use not only in the United States and Canada, but in Mexico, South America, Europe, Asia, Africa, and Australia; in fact, nearly all places where street cars are used.

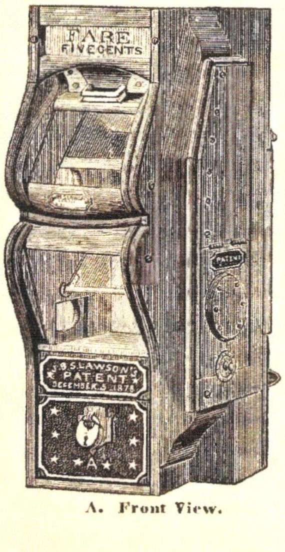
The prices have been greatly reduced, and are made to fit the times. Orders will be promptly filled by addressing

MILTON I. MASSON, Agent, 635 Avenue A, NEW YORK,

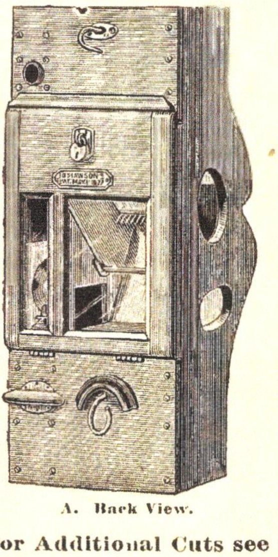
OR THE

JOHN STEPHENSON COMPANY, Limited,

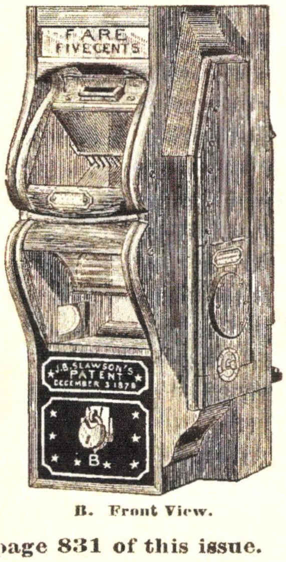
47 East Twenty-Seventh Street, New York.


FARE FIVE CENTS
PATENT
J. B. SLAWSON'S PATENT DECEMBER 3 1878
A

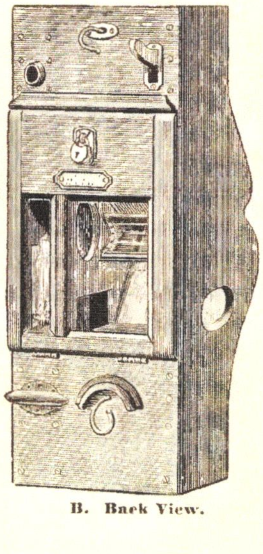
A. Front View.



A. Back View.


FARE FIVE CENTS
J. B. SLAWSON'S PATENT DECEMBER 3 1878
B

B. Front View.



B. Back View.

For Additional Cuts see page 831 of this issue.

OCT 1887

10-87

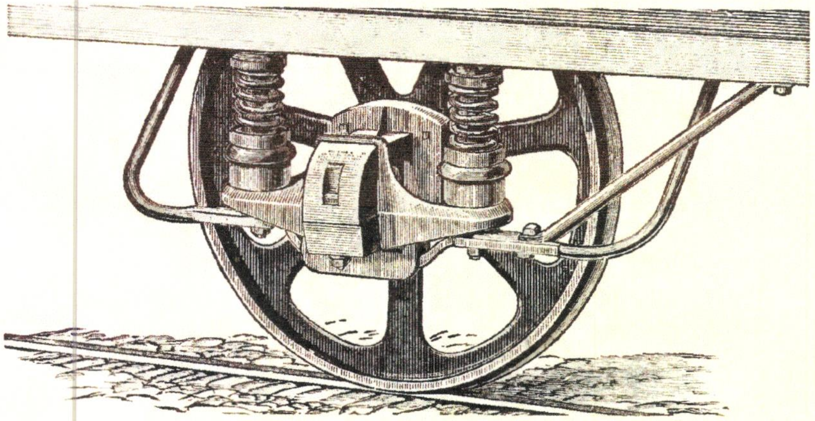
The Bemis Car Box Co.,

MANUFACTURERS OF

The Bemis Patent Journal Box.

Light Draft, Easy Riding, Durable, Economical.

Brasses are warranted for 10 years, and Journal for 20 years. Requires oiling or inspection but once in 12 months. Boxes are positively dust proof.



We Refer to the

Boston Consolidated St. Ry.
South Boston R. R.
Cambridge (Mass.) R. R.
Lynn & Boston R. R.
Union R. R., Providence, R. I.
Globe St. Ry., Fall River, Mass.
Citizens' St. Ry., Worcester.
Brooklyn Cross Town R. R.
Second Ave. R. R., New York.
42nd St. & Grand St. Ferry Ry., New York.
Rochester City & Brighton Ry.
Buffalo St. R. R.
Citizens' Pass. Ry., Pittsburgh.
Pittsburgh & Birmingham Pass. Ry.
Columbus Consolidated St. Ry.
Detroit City Ry.
Louisville City Ry.
Denver City Ry.
Milwaukee City Ry.
Cream City Ry., Milwaukee.
Minneapolis St. Ry.
St. Paul City Ry.
Galveston City Ry.
North Baltimore Pass. Ry.
Chicago Pass. Ry,
Brooklyn City R. R.

Send for Catalogue to

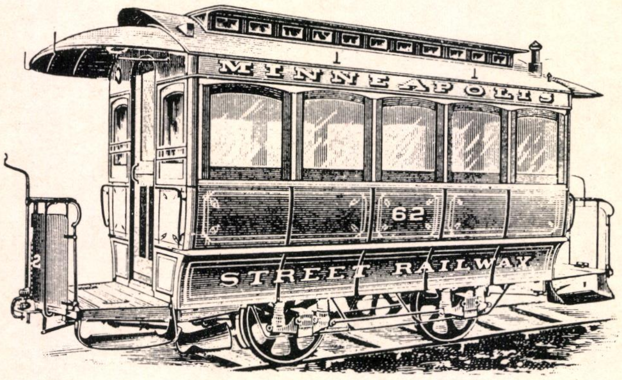
The Bemis Car Box Company,

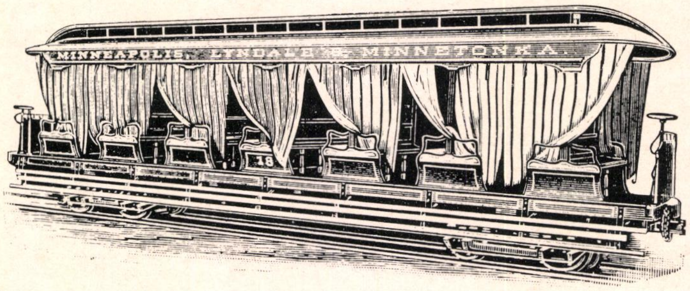
SPRINGFIELD, MASS., or 18 and 20 Platt Street, NEW YORK.

STREET CARS
FOR SALE

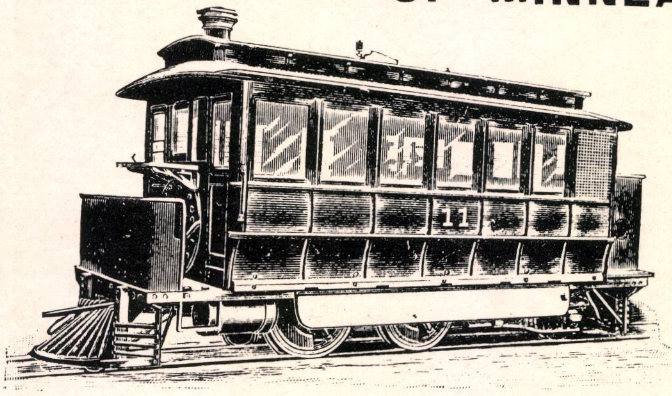
ON ACCOUNT OF

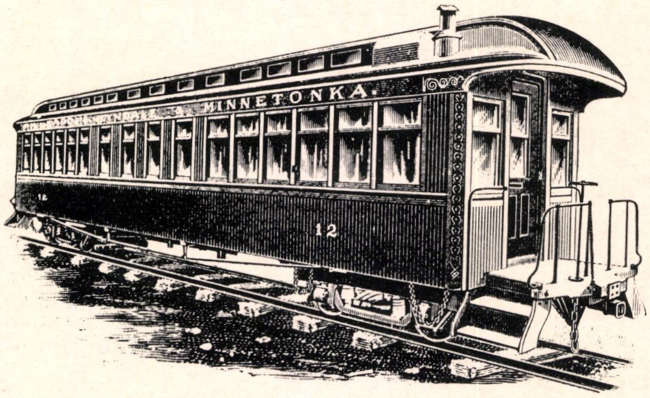
INCREASE OF BUSINESS AND THE ADOPTION OF ELECTRICITY.





THE MINNEAPOLIS STREET RAILWAY CO.,
OF MINNEAPOLIS, MINN.,





OFFER FOR SALE THE FOLLOWING EQUIPMENT:

62 12-foot Cars, all fitted with Fare Boxes and "Small" Conveyors.
76 Extra "Small" Conveyors for 14 and 16 ft. Cars.
63 Extra "Slawson" Fare Boxes.
12 Steam Motors, 15 to 20 Ton.
2 Locomotives and Tenders, 20 and 25 Ton.
21 Passenger Coaches, 26 to 40 ft.
34 Open Passenger Excursion Cars, 34 ft.
8 Flat Cars, 30 ft.

Most of the cars have been in service only a short time, and all are in first-class condition. We can make changes or alterations and fit them up to suit, and will sell very cheap. The gauge of any of the cars can be changed to suit purchaser. Full description and photographs mailed upon application.

1891

MINNEAPOLIS STREET RAILWAY ELECTRIC CARS
Compiled from Minneapolis Tribune Articles

2-20-1890: Signed contract yesterday for electrical equipment of 200 miles of road in Mpls. and St.Paul; Sprague system; amount $2,000,000. LaClede Car Company contract: 60 closed cars: 18'6" body (2'6" longer than those now used), cost not less than $1,000 each, to be ready by September 1st; 60 open cars: aisle thru center, to be in Mpls. by June 1st so as to be ready to receive motors and wiring.

6-28-1890: Received 10 new open cars for use on the 4th Ave. S. line.
7-2-1890: Trucks and motors being placed under them in the shops at 31st St. Junction.

10-8-1890: 40 closed trailers, altered from old horsecars, will be pressed into service as soon as the new motors arrive. Promised to be shipped this week.

10-9-1890: Placed a contract with Edison General Electric Co. for 20 cars [traction motors?] for use between St.Paul and Minneapolis, being required to make a speed of 25 m.p.h.

10-23-1890: Putting some open cars into winter quarters in the Exposition Building.

12-5-1890: Local cars 15 miles per hour; Interurban cars 25 miles per hour.

12-21-1890: Mentions 30 cars for the Interurban line capable of 25 m.p.h. One such car is now in operation on the Minnehaha line.

12-24-1890: A number of new cars for the St.Paul line [Interurban] were received yesterday from the LaClede works at St.Louis.

1-13-1891: Interurban line cars trucks were being modified: old 30" wheels geared 1:11 were changed to new 36" wheels geard 1:9. The cars were painted Green.

1-13-1891: Arrangements were made to manufacture switches [sic] and trolley wheels at the company's shops from patterns made by William Driscoll, master mechanic. Mr. Jones of Jones Car Company, N.Y. is now here arranging for the speedy manufacture of a large number of additional cars.

1-30-1891: The Minnehaha extension fast car will run this winter, but through cars will probably be put on this spring.

2-5-1891: The company is receiving another shipment of 30 cars which should have been delivered in September. They are similar to those used on the "Chicago Ave. & 6th Street" line.

3-15-1891: 120 new cars of the latest pattern are now building. Twenty of these cars will be from the shops ot the Northern Car Company of this city, 60 are to come from the shops of J.M. Jones Sons of West Troy, and 40 from the John Stephenson Company of New York.

5-16-1891: The first of the 50 h.p. motor cars (two 25 h.p. motors) purchased for the Interurban line was tested between 31st St. Statioon and Lake Harriet. J. M. Jones & Sons Co., W. Troy, N.Y. Twelve cars will be in readiness one week from tomorrow. 36" wheels (4th Ave. S. line cars have 30" wheels). Each car to have two trailers. Speed rated at 25 m.p.h.

7-19-1891: The street railway is justly proud of the 20 specimens of cars of home manufacture which have been wheeled out to the 31st St. Station during the week. They are from the works of the Northern Car Company, at Robbinsdale, and in general apppearance resemble the cars turned out by the Jones Company, of Troy, and the LaClede works, of St.Louis, both of which are prime favorites with the street railway people. The Minneapolis cars are 18 feet in length, with the internal furnishing of light wood, with two plate glass mirrors at each end and handsomely upholstered. They will be illuminated by the electric lights, and a corresponding globe is placed at the platforms, front and rear. The body is a bright orange in color, while the metal work is black, forming a pleasing contrast with the other finishing and decorative work. The steps are a variation from those found on other cars. They are made of heavy sheets of wire so arranged that all moisture and dirt will readily pass through, insuring a secure foothold at all times. The cars are numbered from 503 to 522.

8-9-1891: It has been an open secret for some little time that the street railway company was not satisfied with the system of motors which was generally introduced on the electric cars of the two cities. The greatest source of disatisfaction has been the tendency of the motors to get out of order, especially by the burning out of armatures. This latter is an expensive operation, as it costs $50 or $60 to put the motor in order again. The series of thunderstorms a while ago was particularly disastrous in that respect. It is further claimed that the motor is not so easily regulated as that of other systems, and does not run so quietly. Passengers have noticed the jerky way cars often start and stop. This is often but not altogelther due to the carelessness or ignorance of the man at the helm. At all events the order went out some time ago to get no more Sprague motors. It is now reported that the company has gone a step farther and proposed to relegate [sic]the motors already in use and substitute a different system. It has generally been supposed the preferred system was the Thomson-Houston, in use on the Fourth Avenue line. Manager Goodrich, however, intimated in an interview yesterday that it was not the Thomson-Houston they were introducing. He was not disposed to talk on the subject and tell what system it was. He did say, however, that the change was not so general as reported.

12-4-1891: An experiment with one of the Jones motors, which if resulting satisfactory, may bring about quite a revolution its way. The bodies of these motors are 16 ft. long, and the experiment alluded to is in cuttng them into two parts and inserting six feet of new carbody, making them 22 ft. long, with eight wndows on a side. This will make the largest car ever operated by electricity in Minneapolis, and if it works according to expectation the sixty Jones motors on Washington, Hennepin and First Avenues South may be extended in a similar manner.

12-4-1891: An order for 16 new 18 ft. electric motors has been placed with the Northern Car Company, of Robbinsdale, for use on the local lines. These will be identical in appearance with the cars from the same works now in operation, and which have proved equal to the best.

12-17-1891: As rapidly as possible the rheostats, or current regulators, on all the cars, are being removed from the underside of the platform and placed just inside the dashboards. In the former position they were liable to become saturated with moisture and disastrous "short circuits" or "grounds" followed.

12-23-1891: A motor made by joining two 16 ft. Stephenson cars in nearly ready for trial. If it is a success all the old streetcars will be reconstructed this way. 12-24-1891: The street railway company yesterday made a successful trial of a new motor which will doubtless solve the problem of the disposition of the old horsecars. The motor is known as No. 538 [sic] [528 is correct], and is the first of the kind turned out by slicing off the ends of two 16 ft. Stephenson cars and joining them. This made the body of the car 22 ft. long, or 4 ft. longer than the motors now in use. The car is furnished in light woods with crimson upholsterings and is quite handsome. It is constructed precisely as the other motors and promises a great success.

3-9-1892: The new Interurban and Lake Harriet cars now being built at the Northern shops will be supplied with the Short motors which are expected to arive here this week. It is claimed for the Short motors that they will never wear out, and, being Gearless, need no repairs. The wheels on the trucks of the new cars are 33 " in diameter and are 5'2" apart from center to center, and the big handsome bodies resting on them from end to end will measure 36 ft. The motors will weigh three tons or just 1,500 pounds more than the heaviest cars now in use. They will stand as high as a Pullman sleeper and when they run under the Milwaukee Road viaduct at 8th Ave. S. will clear the bridge by only about three inches. The grade at Washington Avenue at that point may have to be lowered.

3-23-1892: Probably the finest car ever placed on any street railway line has just been turned out by Northern Car Co. for the Mpls. St. Ry. It is a vestibuled pattern, eight-wheeled, and cost completed, exclusive of machinery, $1,800. A peculiar feature about it is that both the front and rear platforms are enclosed. The passengers enter through a door, and everyone has to pass the conductor, who collects the fares either as they enter or go out. The inside is elegantly finished, and it is said to ride as easily as a Pullman sleeper. It will be placed on the Interurban line.

3-23-1892: Mr. Lowry---has come to the conclusion that those cars made right at home are better in every way than any made outside. He has consequently given the Robbinsdale people all they can do. Sixty-eight of his 12 ft. and 16 ft. cars are being rebuilt linto 22 ft. cars by cutting them in two in the middle and lengthening them to 22 ft. New sills are put in, extending the whole length, which are further strengthened by a steel plate covering the sill. About one-half of these are completed. The car company is also building 16 entirely new open cars, 32 ft. in length, which will be finished in about six weeks.

12-24-1892: #412 on the Western & 2nd St.N.E. line was hit by a Great Northern Ry. train. Smashed into the center of the side and pushed it 25 feet. [Based on the equipment records this car was rebuilt.]

4-18-1893: Legislature passed the vestibule law, requiring the front part of electric and cable cars be enclosed to protect the motormen and grip men. 6-22-1894: Vestibule law held constitutional by the state supreme court. 7-26-1894: Progress in vestibuling: in addition to those cars vestibuled last year 80 still require vestibuling. 14 are now in the Minneapolis shops; material is on hand to fit 60 more. As to the 20 grip cars in use on the cable line in St.Paul some arrangement will be done by November 1st but what it will be has not yet been determined.

4-18-1895: The track on 31st St. between Nicollet Ave. and 4th Ave. S. was being used for storage of trailers and other unused cars. Residents were asking the city attorney to investigate as this was against a city ordinance. 7-31-1905: Lake St. line was complete so track on 31st St. was supposed to be removed. The old tracks between Nicollet Ave. and 4th Ave. S. were still there with the company using them for storage, particularly at night they are filled with long lines of cars.

1-9-1897: #580 was destroyed in a collision with a CGW RR passenger train at Oak St. & University Ave. [NP Ry original line thru the UofM] The motor with a trailer was running south on Oak St. The motor was hit broadside. The trailer was not damaged.

Minneapolis St. Ry.
Comments on Mpls. Tribune and St Ry Journal Articles

Electrric Cars

12-24-1890: LaClede-built cars of the #363-422 series were used on the Interurban line. 12-2-1890: one also was used on the Minnehaha Ave. line.

5-16-1891: Jones-built cars of trhe $423-502 series were the first cars with two 25 h.p. motors on the Interurban line.

8-9-1891: Explains the reasons for the dissatisfaction with the Sprague motors. Apparently Short Gearless motors were under consideration; they did not get ordered for the Northern-built double-truck open motors 3-9-1892. We don't know if they were actually installed and tried, or were never installed, being replaced by Thomson-Houston W.P. 50 motors.

12-4-1891: This explains the gaps in dates involving the Northern and Stephenson built cars ordered and received earlier in 1891. Sixteen Northern-built #523-538 are referred to in this article. Presumablly this also applies to 11 Stephenson-built #529-539. Also gives and explanation of the lengthening of #284 to 22 ft.

12-23-1891: GIves a better explanation of how #528 was lengthened to 22 ft. by **joining** two SPCR Stelphenson-built cars. If this process was used on the other 29 cars lengthened (became #541-569) it seems to indicatethat a total of 60 cars (30 x 2) was involved.

3-23-1892: GIves additiional information on rebuilding MSR cars to 22 ft. length. 68 cars refers to the 38 for MSR and 30 for SPCR. For the MSR cars it seems as if 12 ft. carbodies were used to provide the 6 ft. center sections. Perhaps these cars were some of the 63 horsecars offered for sale in1891 for which no buyers had appeared. Perhaps some of these 12 ft. cars were also converted to Sallters (July 1892 publication).

3-23-1892: This refers to the car that became SPCR #540.

Articles, most under Operations, dated 1-30-1891, 3-10-1892, 1-17-1897, and 11-23-1898 indicate that some Snow Plows, Sanderss, Salters, were still Trailers, towed or pushed by motor cars (even the open motors were pressed into service).

Snow Plow #1, the "Jumbo" Conveyor Plow, was completed in December 1893. The 19 Snow Plows of the "Pilot type", #2-20, had been built by 1896. Thirteen were assigned to MSR as of 1-17-1897: East Side three, Midway three, North Side (19th Ave. N.) three, Bloomington three (Bloomington & Plymouth line), and the "Jumbo" plow.

The Thomson-Houston Electric Railway System.

The Thomson-Houston Electric Company has recently Purchased all the Van Depoele Electric Railway Patents.

SIXTEEN ROADS IN DAILY OPERATION UNDER THE THOMSON-HOUSTON AND VAN DEPOELE PATENTS.

All Material is now manufactured at the FACTORY at LYNN, Mass., the Largest and Best Equipped Electric Factory in the World.

The Thomson-Houston Motors are superior to all others for railway work.

Only one pair of brushes for each motor.

Brushes self-feeding.

Bearings self-oiling.

No change of brushes for change of load or change in direction of rotation of the armature.

The cars run in either direction with equal facility.

The current is controlled, the car reversed, and the brakes applied from either platform.

Motors are placed beneath the car and do not project above the floor.

Direct gearing is used.

The best and neatest overhead system is covered by the Van Depoele patents.

Contact with overhead conductor is had by means of trolley pressing against the wire from below.

MOTORS AND ELECTRICAL EQUIPMENTS FURNISHED FOR MINING AND OTHER SPECIAL WORK.

For full information and estimates address the

THOMSON-HOUSTON ELECTRIC COMPANY,
178 DEVONSHIRE ST., BOSTON, MASS.
148 MICHIGAN AVE., CHICAGO, ILL.

MINNEAPOLIS ST. RY. ELECTRIC CARS
Compiled from Street Railway Journal articles

December 1888: The Sprague Company of New York have a contract for installing the electric railway. The first portion of the equipment consists of 3 Sprague motor cars.

November 1889: The cars [4th Ave. S. experimental line] will be equipped with the latest type of electric trucks, on which will be placed two 15 h.p. motors. These motors are flexibly suspended from the truck, and are geared by means of pinions composed of alternating layers of steel and rawhide to a split gear on the car axle, the reduction in speed from the armature shaft to the car axle being twelve to one. These cars, which are capable of being operated from either platform, may be run as fast as twenty miles per hour, and when running at a maximum speed can be stopped in twice their length. There is power enough in each car to enable it to tow two additional cars at the rate of twelve miles per hour.

January 1891: Interurban line cars are running every ten minutes.

May 1891: A number of contracts have been let by the street railway company within the past month. about 1,300 tons of steel rails have been contracted for with the Illinois Steel Works of Chicago. 1,000 cedar center poles will be furnished by Brownlee & Co. of Detroit, Mich., and about 120 new cars are building. Twenty will be from Northern Car Co. of Minneapolis, sixty from J. B. Jones' Sons of West Troy, and forty from the John Stephenson Co. of New York. As soon as forty new streetcars arrive, trailers will be placed on the Interurban line. The company is said to intend to increase the speed of the motor cars to twenty-five miles per hour. The present average rate is sixteen.

May 1891: It is reported that one of the cars of the Street Railway Co. was burned last month. It is supposed that the car caught fire from a defective insulator in the roof. The destruction was very rapid and could not have been caused by lightning.

June 1891: A system of colored lights will be introduced. Each line will be denoted by a separate incandescent light globe on the front and rear of each car.

October 1891: Typical car costs:

Body, 18 ft. closed, open platforms	$1,000
Electrical equipment	$2,000
Truck	$ 250
Total	$3,250

December 1891: A trial was given to the new Scott-Driscoll electric motor lately. The trip was out to Lake Harriet and return, and the distance from the lake to Washington Ave. was made in 15 minutes.

January 1892: A number of cars have been equipped witgh Burton electric heaters, and several snow plows have been purchased. The company has placed an order with the Northern Car Co. for 16 new 18ft. electric cars for local use, the same size as those now running. They will be numbered from 523 to 539 [sic], painted yellow and finished in cherry.

LACLEDE CAR COMPANY
ST. LOUIS, MO.
LACLEDE CAR CO.
ST. LOUIS, MO.
LACLEDE CAR COMPANY,
ST. LOUIS, MO.
DANGEROUS TO STAND ON PLATFORM.
LACLEDE CAR CO. ST. LOUIS
DO NOT TALK TO MOTOR

New Car Equipment for Minneapolis and St. Paul.

SRJ —— FEB 1893

An order for sixty new cars for Minneapolis and St. Paul has been awarded the American Car Company of St. Louis. The new cars will be put in operation on the interurban line between those two cities; they are very handsome and embody a number of novel features. As the car is worked on a loop, the steps are on one side only. The motorman is enclosed in a cab in the vestibule, separated from the open part of the latter by a sliding door. When a passenger wishes to enter the car by the front platform the door of the car proper is opened by the conductor at the rear platform by means of a lever. In the motorman's cab is the mechanism for controlling the power and the brakes. The heater is of the standard railway type, and is fed with coal from the cab by the motorman. The car is heated by means of flues connected with the heater, and also with a register under each seat on the left hand side of the car. The seats are of the standard railway type, with center aisle, and were made by Hale & Kilburn, of Philadelphia. The frames are of cherry, with spring seats and cane backs. The interior finish is in cherry, in the natural color of the wood. The spring curtains are equipped with Hartshorn patent rollers, and are of Burgess cloth; the Burrowes patent fixture is used. The ceiling is of birdseye maple tastefully decorated.

The car has twelve double seats on each side, and will thus seat forty-eight passengers. The length over all is forty-two feet six inches. Five double electroliers are provided, arranged in alternate circuit.

Each car is equipped with two twenty-five horse power, Thomson-Houston S. R. G. motors. One of the trucks is equipped with Allen paper wheels. The trucks are of the Bemis type. All other accessories are these in use on ordinary electric cars.

S. L.

MINNEAPOLIS STREET RAILWAY SERVICE EQUIPMENT

Compiled from Minneapolis Tribune articles

HORSECARS

11-8-1877: The snow plow made its first trip this morning, starting out at 1 a.m., cleaning the track so thoroughly that cars have been running on time all the forenoon.

11-27-1877: Heavy four-horse scraper....keeps the freezing mud and snow from engulfing the tracks a foot deep.

11-12-1880: The snow plow was placed in service yesterday.

2-6-1881: Snow storm, 18" fell. Four snow plows with four horses each were in use.

A local publication dated July 1892 reported that old "bobtail" horsecars were being rebuilt to Salters, and that MSR and SPCR combined had about 40 such cars. Based on the Trumbull 1-18-1893 Report I speculate the 31 Salt Cars-Common (MSR 20 + SPCR 11) were originally horse-drawn. My comments on page 3 MSR and page 5 SPCR regarding conversion of horsecars to Salters probably pertain only to the 20 Salt Cars-Automatic (MSR 13 + SPCR 7).

EARLY ELECTRIC CARS

1-30-1891: Company has been building some snow plows; because of the late snow season a full stock of these were on hand. The open cars were pressed into service for power, then followed the snow plow and the salt car behind. This plan works better than to build a snow plow and motor combined.

A local publication dated July 1892 reported that several Snow Plows had been purchased.

1-17-1897: Snow storm; the company had every available car and snow plow in active use. Many of the open motor cars were called out and placed in front and at the rear of the snow plows. Fully 20 snow plows were on the various lines. 3-12-1897: 4" to 5" of snow as of 3-11 midnight. 13 snow plows were in service: East Side 3, Midway 3, North Side 3, Plymouth & Bloomington line 3, and Bryant Ave. line 1 big one [the "Jumbo" plow].

3-26-1897: Of the snow plows in the hands of the company the monster known as "Jumbo", weighing 33 tons, did greater work during the past season than was necessary during the three preceeding winters. The average citizen has no conception of the great quntities of snow along the lines of outlying districts. It was there that "Jumbo" became the most valuable by reason of its superior weight, and it swept the snow from in front like chaff.

Sprinkler Cars

5-10-1891: The entire route of the Interurban line from the loop in Minneapolis to the St. Paul run-around is to be sprinkled with water and kept free from dust. A line of water cars arranged similar to the conventional street sprinklers are now being built and will be placed on the road as soon as they can be gotten in order. The water cars will each be mounted by a tank 6 ft. by 6 ft. and 12 ft. long. Two or three cars will be connected by a hose so that one train can sprinkle all the way from one city to the other.

5-13-1891: The Mpls. city engineer calculated that the Washington Ave. bridge would hold the weight of one motor car with two sprinkler cars attached.

6-09-1891: Water cars for sprinkling the Interurban tracks between the Twin Cities are being built and will be put on as soon as completed. The main tanks holding the water will weigh, when filled, 13 tons each. At each end of these tanks are three pipes leading to a peforated sprinkler, like those used on an ordinary sprinkling cart. The arm is 11 ft. wide on the right-hand side. This arm will sprinkle one side of the roadway beside the track, and will be so arranged that it can be pulled in when a team is met on the road. One of these cars will run between 15th Ave. S. and Midway Park, and the other between Midway Park and St.Paul.

8-13-1891: The sprinkler tank cars were taken to Midway Station yesterday. They will be put to work on the Interurban line as soon as the dust begins to fly.

8-22-1897: Street sprinkling was being discussed in the city council. It was reported that TCRT developed the idea several years ago but abandoned it after a trial.

motors were ready and everything in place, the mules were taken off, the electric motor substituted, and the road opened on schedule time. From the beginning the traffic increased two-fold, and the motors, instead of exerting ten horse power, were and are actually doing the work of fourteen, calculated according to Haswell and Molesworth.

The average speed of the motors with two cars filled with passengers is ten miles per hour, although five miles is all that was contracted for. The increased traffic is not due to the novelty only, but business men and others who utilized carriages rather than ride in cars going at such a slow rate of speed prefer the electric motor on account of its rapidity, &c.

In fact, the residents at the extreme end of the road petitioned the company to extend the track one mile, agreeing to pay all the charges of material, laying, &c., provided the company would equip the road with two more motors. This offer was accepted, the road extended and two new motors of larger capacity ordered, one of which, the "Ohm," was shipped on the 10th of November, and is running very successfully. A grade of 275′ to the mile on a curve of 40° radius has been included in the extension. The fourth motor, the "J. L. Keck," will arrive in Baltimore the first week in December. All the motors are built like the illustration presented herewith. Mr. T. C. Robbins, Superintendent of this road, the Baltimore Union Passenger Company, informed the writer that it had cost them eighteen dollars per day to maintain the mules, and it is costing them now for coal, engineer, &c., with double the traffic, about seven dollars per day; at the same time he was not now fretting lest one of the motors should die. What better results could any syndicate of men desire?

It is to be hoped that the time is near at hand when hot cinders, dirt, noise, puffing and liability of explosion on the elevated railroads will be superseded by this noiseless, inexpensive agent.

For the benefit of those who might question the economy of electricity applied in this way, I submit herewith an estimate of the relative cost of equipping a ten-mile section of street railroad by electricity and horses.

DAFT SYSTEM.

(The assumption being that fifty cars are to be run and 150 H. P. ready for delivery on track at all times.)

250 H. P. engine and boiler, set up	$10,000
Generators	12,000
50 motors, including cost of attachment	40,000
	$62,000

for machinery to operate a line of ten miles with fifty loaded cars, which may all be moving at the same time.

Assuming a run of sixteen hours per day per car, the running expenses would be about as follows per diem:

Coal, 4 tons	$15 00
Engineers	6 00
Firemen	4 00
Machine men	6 00
Oil, waste, etc	3 00
Depreciation	15 00
Making a total per diem	$49 00

or less than $1.00 per car running sixteen hours.

HORSES.

400 horses at $125 each	$50,000

RUNNING EXPENSES PER DAY.

Maintenance of 400 horses, at 50c. each	$200 00
24 stablemen, at $1.50 each	36 00
12 other stable employees, at $1.50 each	18 00
Depreciation	32 87
Making a total per diem of	$286 87

Something less than $6.00 per car for the same run.

The cost of rolling stock, conductors, etc., being subject to local conditions, the foregoing comparison is simply that of electricity *versus* horse flesh as a motive power.

Mules in Northern Minnesota.

We recently asked numerous street railway managers some questions relative to the use of mules on surface roads, climates, medical treatment, etc. The following replies will be found of interest.

Editor Street Railway Journal:—In Minneapolis and St Paul we have about 560 head of stock. They are about 14½ hands high; weigh from 800 to 900 lbs. We have worked them for about four years. The following are the points for the mule:

1. It does not cost any more to keep two mules than a horse, and they will do a third more work.

2. They stand the cold fully as well as the horse and do not feel the heat like the horse.

3. As yet we can not notice any breaking down, but seem to be improving on the work.

Our objections to the mule are:

1. That our business is getting too heavy and rapidly increasing. They can carry loads on a business of $15 or $16 per day, per car, but when they do heavier work they can not make time.

2. There is no market for the mules when they break down. As for our horses we can get about three-fourths what they cost.

So you see we think for a place that is settled and not growing like our two towns they would be all we could ask for, but not growing towns like Minneapolis and St. Paul.
C. G. Goodrich,
Sect. Minn. Street Railway Co.
Minneapolis, Minn.

Editor Street Railway Journal:—In answer to your letter of enquiry as to how we find mules to stand the climate in Northern Michigan, will say that we put our mules on last Spring, after the snow went off; we have had a very cool summer and they seem to stand it well so far. We are very much pleased with them in every respect, and should they prove to stand the cold winter that we expect will soon be here, we shall purchase more this coming spring.
C. N. Newell,
Supt. Muskegon Railway Co.
Muskegon, Mich.

Editor Street Railway Journal:—In answer to your letter enquiring about medicines used for ailments of mules, I would say that we keep on hand at each stable a small stock of remedies for the most common troubles, all ready for use, viz: Colic draughts, fever mixtures, washes for greasy and cracked heels, collar and harness abrasions, liniments for sprains of muscles and joints—these are used according to directions on bottles. For injuries to the body and feet we find it necessary to give them personal attention until out of danger, as they need special or surgical treatment.
Alexander Harthill, V. S.,
Louisville City Railway Co.
Louisville, Ky.

Cost of Street Railways for Small Towns.

Editor Street Railway Journal:

Please give me the cost of construction of a street railway and the maintenance of the same for a small town. If you have a work on the subject let me know price.
S. R. Ferguson.
Bristol, Tenn.

We handed the above communication to Mr. Wm. J. Richardson, Sec. of the A. S. R. Ass., for his suggestions, thinking that he might know of some work. Following is his reply:

Editor Street Railway Journal:

In reply to yours of 10th inst., with letter enclosed, would say that my recommendation to you is to call the attention of Mr. Ferguson to the list of street railways, as published in the Street Railway Journal. There is enough that is descriptive regarding each road to suggest to Mr. F. what the size of the road would be in his town.

I would recommend that he write a half dozen or so letters to the managers of these different roads. They will, undoubtedly, be glad to give to him the information he seeks. I know of no publication in which the same can be found.

There are English works on "tramways," one costing $1.50, the other $12.00, in two large volumes, which can be purchased from Theodore Audel & Co., at 32 Liberty street, New York.
Wm. J. Richardson.
Brooklyn, N. Y.

Will some general managers of street railways in our smaller towns send us the information Mr. Richardson refers to? There being no work containing this practical knowledge, its publication in our columns will be of great convenience. to many who, like our correspondent, are just entering on street railway enterprises.

Medicine in the Stable.

Supt. Lake, of the Chicago West Division Railway, says:

I do not employ a farrier except in desperate cases; when these occur the doctor is called. I have a practical druggist and laboratory. We have many compounds and preparations that have been suggested by many years' experience. My stable foremen are entrusted to give or apply these remedies.

Google

St.PAUL CITY RY. HORSECARS
Compiled from Street Railway Journal articles

December 1884: New cars added (37), cost $50,000 (including other rolling stock and equipment). Three new snow plows have been bought and one is building.

March 1886: SPCR has ordered from the John Stephenson Co. and the Brownell & Wight Car Co. new cars in place of those recently destroyed by fire. June 1886: The Lewis & Fowler Mfg. Co. exhibited one of the new cars built for St.Paul [City] Railway Co. by the John Stephenson Company, and equipped with Small's Patent Automatic Street Car Fare Conveyor, at Union Square and Broadway for two days, and a continuous stream of citizens examined the "Conveyor" and expressed their highest approval.

May 1886: John Stephenson Company; 20 very handsome cars for the St.Paul City Railway are going our of their factory. [Assume Brownell& Wight order was for 22 cars.]

May 1886: SPCR to add 42 cars.

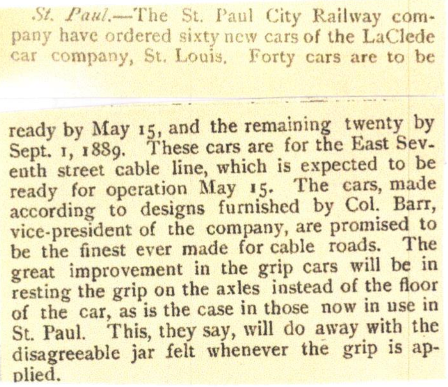
May 1887: Will build 1.5 to 2.0 miles of cable this year; miles of track have increased from 37 to 52, number of cars 82 to 128, quantity of horses 600 to 650.

January 1888: The number of cars will soon be increased to 140.

January 1892: The carbarns on W. 7th St. burned to the ground last month. Recently used as a storehouse, and 23 disused cars stored in it. Loss is $2,000 on building and $8,500 on contents, fully insured.

Street Railway Gazette
August 1887
Brownell & Wight has cars
under construction for
St Paul
145-151?

SRG
JAN 1889



St. Paul.—The St. Paul City Railway company have ordered sixty new cars of the LaClede car company, St. Louis. Forty cars are to be ready by May 15, and the remaining twenty by Sept. 1, 1889. These cars are for the East Seventh street cable line, which is expected to be ready for operation May 15. The cars, made according to designs furnished by Col. Barr, vice-president of the company, are promised to be the finest ever made for cable roads. The great improvement in the grip cars will be in resting the grip on the axles instead of the floor of the car, as is the case in those now in use in St. Paul. This, they say, will do away with the disagreeable jar felt whenever the grip is applied.

St.PAUL CITY RY. CABLE CARS
Compiled from Street Railway Journal articles

May 1888: LaClede Car Company is full of business: 20 new open grip cars for St. Paul.

January 1889: LaClede Car Company has an order for 20 grip cars, 20 open cars and 20 closed 16ft. cars. Internal fittings include Post & Co.'s (Cincinnati) new centre lamp.

September 1889: LaClede Car Company has an order for 20 closed cars for the cable line.

St.PAUL CITY RAILWAY HORSECARS AND CABLECARS

Compiled from Minneapolis Tribune Articles.

10-18-1880: The service employs at present 14 cars, 125 horses, and 35 men. The new cars (double) which are now on the Western Ave. & Mississippi St. route are the finest in all details of any in the street railway service.

2-19-1882: In anticipation of extensions the new owners have contracted for 10 new cars to be delivered on or before May 1st, and for the option of calling for 15 more.

8-30-1883: Received a number of new cars [quantity not reported].

2-10-1886: 24 or 25 cars destroyed in Smith Ave. carhouse fire.

7-19-1887: figures quoted as of 1-1-1887: 27 miles of track, 66 cars in use.

9-27-1887: As of January 1st the total number of cars in use was 84. University Ave. line, 14 cars, 14 minute service; Rice St. line, 13 cars, 8 minute service; West 7th St. line, 15 cars, 7 minute service; St. Anthony Hill line, 13 cars, 5 minute service, and East 7th St. line, 12 cars, 6 minute service. [This adds to 67 cars; not all the lines are listed.] The new cars, now completed, including cable cars, are 58, thus giving a total of 140 cars [84+58=142], to which the company proposes to add 10 additional cars at some future time not specified.

8-31-1889: Twelve new closed cars have been placed n the E. 7th St. cable line, now making 20 in all. [#234?]

6-12-1892: Ten years ago SPCR consisted of four lines with less than 20 miles of track, four horsecar barns, 30 horse cars, 200 horses and mules, 75 employees. The cars were very short and dingy-looking. A few of them are in the possession of the company, and one of them is occasionally drawn through the streets by one of the elegant motors for mechanical purposes.

St.PAUL ELECTRIC CARS

Compiled from Minneapolis Tribune Articles

6-12-1892: The company's serviceable rolling stock is as follows: electric motors 93, trailers 40, grip cars 40, cable trailers (including winter and summer) 66, total 239 cars. The Interurban line's rolling stock is not included in these figures.

St.PAUL CITY RAILWAY ELECTRIC CARS

Compiled from Street Railway Journal articles

February 1891: The Edison company have about fifty electric cars in operation. Seventeen Edison motor cars are in operation on the University Ave. line, a car being run through from St.Paul to Minneapolis for the first time December 7, 1890. The distance is about eleven miles, and the cars are run on eight minutes headway. A five-cent fare us collected in St.Paul and another fare after crossing the city limits. Transfers may be obtained in either city, thus enabling passengers to travel from any point in St. Paul to any point in Minneapolis for ten cents. The regular fare on the steam roads is thirty cents one way, or round trip for fifty cents. The time taken by the electric cars to cover the eleven miles is about fifty minutes at present, but new motors are now being placed on the trucks and the time will probably be reduced to thirty-five minutes.

Eight cars equipped with Thomson-Houston motors are now run on the West Seventh Street line, ten Edison motor cars on the Grand Avenue line, ten Edison motor cars on the Rice Street line. These with extra cars run during busy hours of the day, make an average of fifty cars per day. The extensions in other parts of the city are being rapidly pushed forward and by Spring probably at least 120 motor cars will be in operation in this city.

February 1891: The SPCR Co. have just completed a snow broom which, as yet, has not been tried on account of lack of snow. The new eighteen-foot closed cars which are to be run between St.Paul and Minneapolis have just been received, and are rapidly being put into service.

February 1892: The first "made over" motor car to be turned out of the Northern Car Co.'s shops has been put in service. The body is twenty-two feet long, and the length overall thirty feet. It is the result of joining two sixteen-foot Stephenson horsecars from St.Paul. Others of the same pattern will be completed as fast as the company can turn them out, and they will be the most commodious ones upon the line.

St.PAUL CITY RAILWAY
Speculation on Horsecar Purchase

St.Paul Street Railway

July 1872	4 cars purchased from Andrew Wight
7-27-1872 purch. auth.	2 cars
May 1874 ordered	4 cars quantity based on August cars owned
August 1874	10 cars owned All 8 ft. Closed?
May 1875	5 cars 10 ft. Closed
9-28-1877	15 cars =====

St.Paul City Railway

11-29-1878	12 cars owned from the forecllosure sale.	Began with #1.
1878	2 cars .later settlement from the 3 other SPSR cars.	Ended with #14.
6-17-1879 purch. auth.	3 new cars 10 ft.? Closed	#15-17
10-24-1879 purch. auth.	8 new cars for Spring 1880 delivery 12 ft.? Closed	#18-25
2-13-1882 purch. auth.	2 cars @ $700 each 12 ft.? Closed	#26-27
2-19-1882 contracted for	10 new cars 12 ft.? Closed	#28-37
Spring 1883	12 new cars (2 received in December; 10 expected shortly) 12 ft.? Closed	#38-49
Year 1884	37 cars added 14 ft. Closed	#50-86
March 1886	Orders placed with Stephenson, Brownell & Wight to replace 24 or 25 cars destroyed in Smith Ave. Carhouse fire 2-10-1886.	
May 1886 SRJ	42 cars to be added 14 ft. Closed 20 cars Stephenson; 22 cars Brownell& Wight	#87-128
9-27-1887	58 new cars (including cable) being completed. 28 cars could be the 16 cable trailers (129-144) and 12 cable grip cars (152-163).	

Directories:	
1882	28 cars
Dec. (?) 1883	36 cars housed in the St.Peter St. facility.
1884	77 cars
May 1887 SRJ	128 cars; increased from 82
1-1888 Directory	128 cars
1889 Directory	159 cars
7-1-1890 US Census	113 cars

Mortgage Bond issues:	
4-1-1884/10-1-1884 bond issue	79 cars
1-15-1887 bond issue	93 cars

A. L. Drum 1920 valuation	118 horsecars purchased.

Sales of Horsecars:	
1882 Billings, Mont.	2 cars
1882 Nov. Duluth	1 car
1883 Jul. Duluth	2 cars
1886 Apr. Duluth	12 cars ? 5-2-1886 some cars being overhauled in MSR's 3rd Ave. N. Shops. Could some of the 12 be new cars from John Stephenson Co.?
1888 May Duluth	3 cars? New cars?

Minneapolis Tribune

Electric Water Sprinklers

5-10-1891

The entire route of the Interurban line from the loop in Minneapolis to the St. Paul run-around is to be sprinkled with water and kept free from dust. A line of water cars arranged similar to the conventional street sprinklers are now being built and will be placed on the road as soon as they can be gotten in order.

The water cars will each be mounted by a tank 6 ft. by 6 ft. and 12 ft. long. Two or three cars will be connected by a hose so that one train can sprinkle all the way from one city to the other.

5-13-1891

The Mpls. city engineer calculated that the Washington Ave. bridge would hold the weight of one motor car with two sprinkler cars attached.

6-09-1891

Water cars for sprinkling the Interurban tracks between the Twin Cities are being built and will be put on as soon as completed. The main tanks holding the water will weigh, when filled, 13 tons each. At each end of these tanks are three pipes leading to a peforated sprinkler, like those used on an ordinary sprinkling cart. The arm is 11 ft. wide on the right-hand side. This arm will sprinkle one side of the roadway beside the track, and will be so arranged that it can be pulled in when a team is met on the road. One of these cars will run between 15th Ave. S. and Midway Park, and the other between Midway Park and St.Paul.

8-13-1891

The sprinkler tank cars were taken to Midway Station yesterday. They will be put to work on the Interurban line as soon as the dust begins to fly.

THE STREET RAILWAY JOURNAL. SEPTEMBER, 1891.

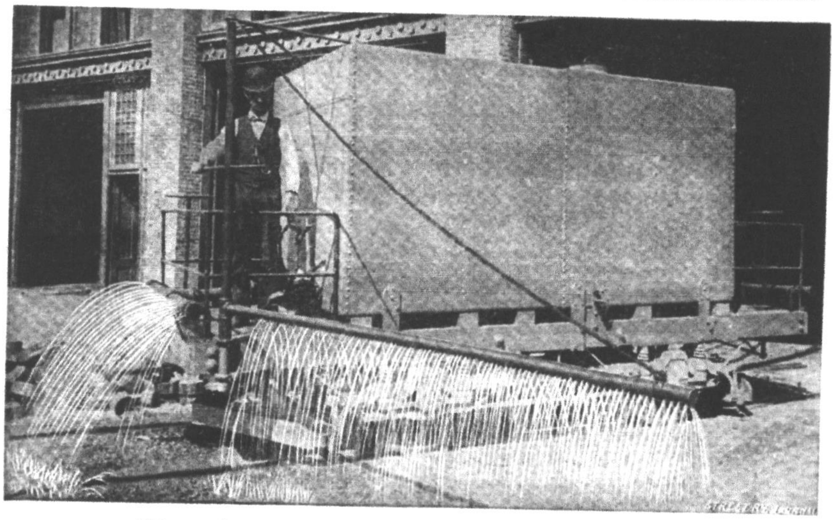


FIG. 10.—SPRINKLING CAR—MINNEAPOLIS STREET RAILWAY.

STREET RAILWAY REVIEW JUNE 1891

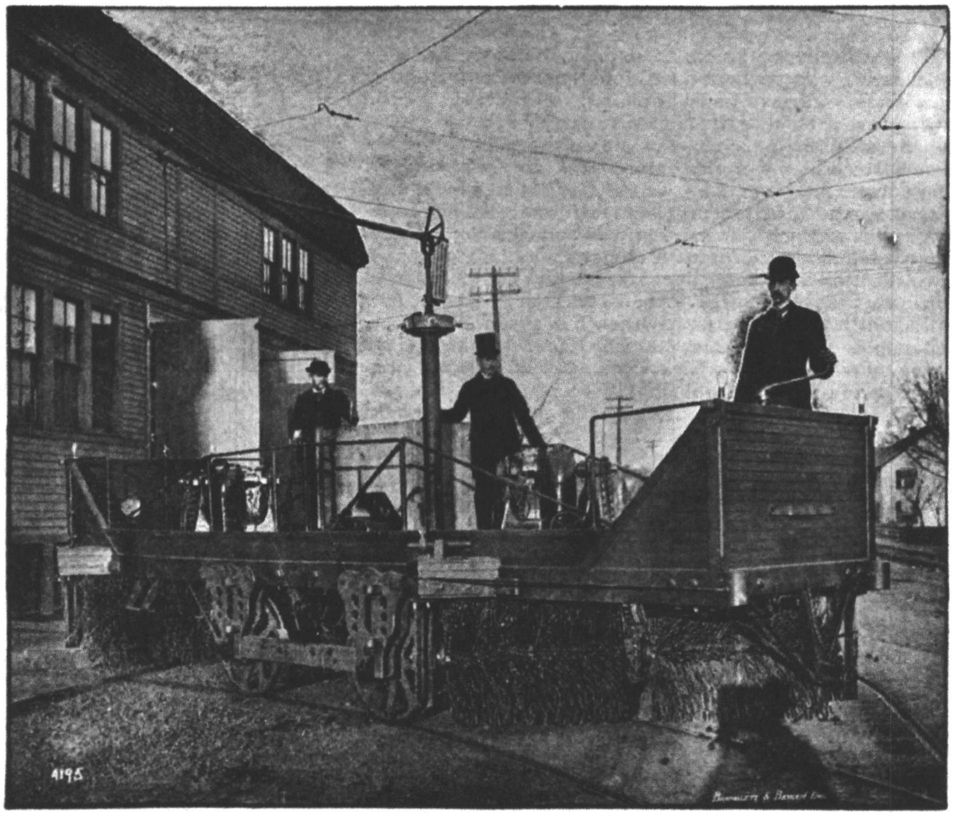
A Railway Sprinkler.

THE opening of the new Inter Urban Line between St. Paul and Minneapolis, has discovered the fact that outside the cities and while traversing some 6 miles or more of the distance which is beyond the pale of the water mains, that on certain favorable days the dust is found to be a no small and decidedly unpleasant feature of an otherwise delightful ride. To remedy this evil there is almost finished at the shops of the Minneapolis City Railway, a giant tank, made of ⅛ inch boiler iron, and mounted on a flat car carried on four 36 inch wheels. A piece of four inch steam pipe capped at each end, and suitably perforated with small drill holes, rests across the rear platform. The connecting pipes of the same diameter as the cross pipe, connect it with the tank and insure a bountiful supply of water. It is intended to draw the tank car behind a motor car and by making a trip every two hours, the entire length of the line will be sprinkled in a round trip of eighty minutes. The tank is closed except for a manhole in the top which has a suitable cover, the entire tank car is strongly built and from a little distance resembles the tender of a locomotive. It will be handsomely painted, and will combine novelty and utility as well as serving a useful purpose.

if the responsibility really rests at the door of the engineering profession. The assignable cause is probably commercial. Large and relatively slow speed generators coupled to vertical compound engines of several hundred horse power is the general European practice. But European capital, contenting itself with smaller and slower returns, is willing to make the disproportionate investment required by the comparatively slow speeds which are alone possible to the forms of construction there adopted. In this country we must have faster running machinery, more compact in form and of a greater earning capacity per dollar of cost. When we add to this the further imperative requirement of safety, economy of maintenance and operation, and economy of fuel under fluctuating loads, we have before us a problem which can be permanently and successfully solved only by compound or triple expansion engines of special design, having in view a terminal pressure of exhaust which shall not fall below atmosphere, even under light loads. Such an engine would come under the high speed class, while the dynamo would in its class be distinctly low speed. The original idea attempted in various shapes of forcing an engine to an abnormal speed to meet the supposed necessities of the dynamo was unnatural and wrong. The present state of electric art now permits the reasonable practice of cutting down the speed of the dynamo to the normal requirements of the engine.

In this direction all modern engineering is strongly tending, and it has been predicted that the generating plant of the immediate future is to be the direct coupled, slow speed, multipolar generator for railway and electric lighting stations.

The advantages are many. The first cost of a plant on this principle, as compared with a system involving counter shafting, clutch pulleys, belt tighteners, belts, etc., is in its favor. This is true when referring to the machinery alone, but is strongly emphasized when the further value of the reduced cost of real estate and buildings is considered.



COLUMBIA ELECTRIC SNOW PLOW AND SWEEPER.

Every transformation or transmission of energy is a loss of money, and it follows that, when the crank shaft of the engine is the armature shaft of the dynamo, the loss is reduced to its lowest terms. When it is considered that the normal resistance of an armature is strictly torsional, the difference will be quickly appreciated between the power required to drive it when spinning it by the end against that required to drive it under the transverse strain of a heavy belt. Under ordinary conditions, the belt strain to transmit 200 H. P. will be about 1,500 lbs., and the friction due to this strain is twice repeated, once on the shaft of the engine and once on the shaft of the dynamo. This is the simple case of an engine belting direct to the dynamo. Where counter shafting is employed, the frictional loss is again doubled by being repeated at the receiving and delivering bearings of the counter shafting. The work required to overcome this friction is a net loss and can never fall below the minimum above described when everything is in line. If the engine shaft or the counter shaft is out of line, the friction load may run up to a very large figure, limited only by the preservation of the bearings. With the direct connected dynamo, the frictional load due to these causes, of course, entirely disappears, leaving nothing but the internal friction of the engine to be accounted for.

To these advantages should be added that for the saving in space and reduced cost of attendance and maintenance, the coupled generator possessing manifest advantages in eliminating the belt account wholly, and the oil and babbitt account in large part.

The absence of the noise which is inseparable from the use of belting, also becomes a consideration in stations centrally located in business and residence districts.

Columbia Electric Snow Plow and Sweeper.

A new snow plow and sweeper for street railway use has recently been placed on the market by the Columbia Electric Co. of St. Paul, Minn., and is illustrated in the accompanying engraving. The sweeper consists of a plain truck with a thirty H. P. motor in the centre, which is used to propel the car. Two other motors of ten H. P. each, are placed upon the two ends of the truck, each of which operates large brushes suspended from the car, and extending diagonally across the entire track, so that both rails are covered. These brushes are provided with a device by which they can be raised or lowered at will. All of the three motors used are reversible, and each can be worked independently of the others by the will of the motor man, who has control of the whole arrangement from his position on the rear of the car platform. He can thus run the car backward or forward with or without the brushes in motion, and can run the brushes either backward or forward as circumstances may require. It will be readily seen that by such complete control the tracks can be kept thoroughly clean. The car is either provided with a cab, or is left clear with an iron railing

Digitized by Google

only, as may be desired. Each motor is put in a water tight cover, so as to protect it from moisture.

The car is lighted with a cluster of six lights on the trolley turret, and one on each corner of the car, making ten lights in all. The speed of the machine, when removing a light fall of snow, is from twelve to fifteen miles an hour, and it can readily remove a depth of from three to twelve inches at a speed of from four to ten miles an hour.

In case of drifts the car can be run at a very low speed, and the brushes at a high speed, thus cutting a way through the snow. As the car has its motors above the floor instead of underneath, they are protected as much as possible from dampness.

A complete test of these sweepers or plows was made last winter, with the result of proving them successful in the highest degree, and thus placing them beyond the experimental state.

Some Recent Interesting Electrical Work.

The Equitable Engineering & Construction Co., whose headquarters are in the Drexel Building, Philadelphia, have, during the past year, constructed a number of electric railways, and have done considerable special work of more than ordinary interest.

Among the electric railway work may be mentioned the following: An extension of the Richmond & Manchester Railway at Richmond, Va., upon which were placed two additional cars and additional feeders, doubling the capacity of the road and increasing its efficiency; the Highland Park Electric Railway and the North Side Electric Railway, both in Richmond, Va., owned and controlled by the same men, aggregating about four miles, with two cars; the Athens Electric Railway, five miles long with four cars, on the Rae system, and the Lebanon & Annville Street Railway Co. of Lebanon, Pa., a nine mile road on the Edison system. In Fig. 1 is presented a view on the Highland Park line, and in Fig. 2 a view of the tower wagon used by the company in their overhead line work.

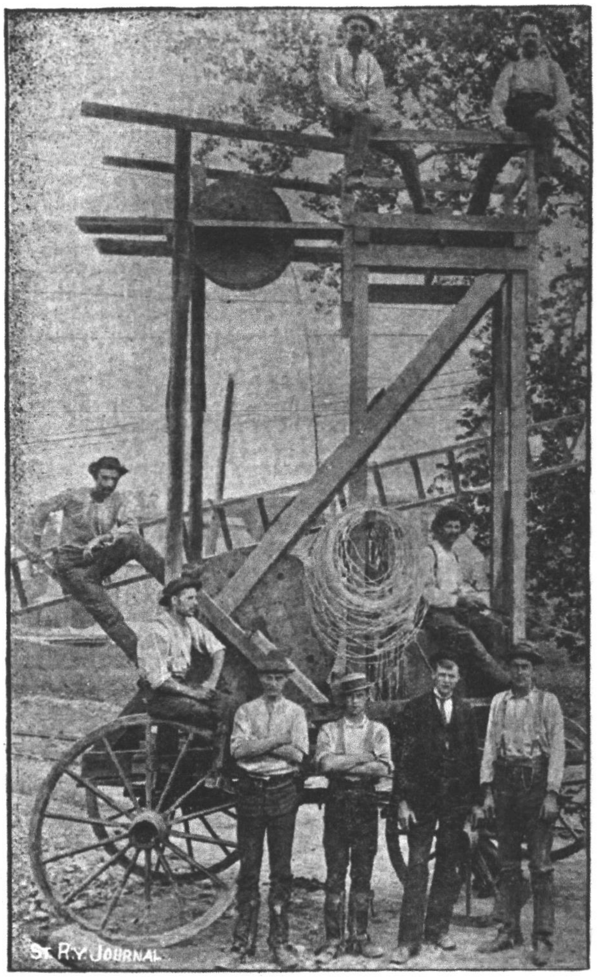


FIG. 2.—HIGH WAGON FOR OVERHEAD CONSTRUCTION.

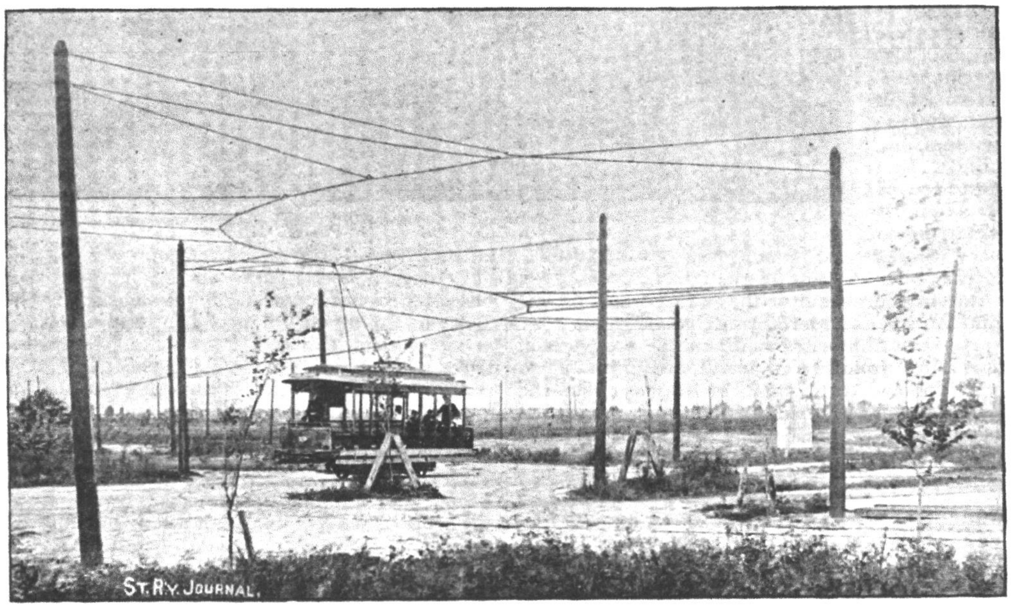


FIG. 1.—REVERSE CURVE—HIGHLAND PARK LINE, RICHMOND, VA.

The most important special work done by this company has been the electrical equipment of the travelling cranes in use at the Baldwin Locomotive Works in Philadelphia, which is said to be the largest electric travelling crane plant in the world (Fig. 3). There are two large cranes, each capable of lifting 100 tons. The cranes proper were built by Wm. Sellers & Co. of Philadelphia, and each crane has two forty H. P. electric motors. All the details for the electrical equipment were worked out

Digitized by Google

duction device is thus avoided. The operation is dependent upon the existence of a certain difference of phase between the currents of the primary and secondary coils, and will be readily understood by reference to the accompanying diagram.

Here A represents the field magnet of a motor, which is built up of sections or plates. B and C are polar projections upon which the coils are wound. Upon one pair of these poles, as C, are wound the primary coils D, which are directly connected to the circuit of an alternating-current generator. The secondary coils, F, are wound on the same poles with the primary, and connected with other coils, E, which surround the poles B.

The current in both the primary and secondary coils will lag behind the impressed electromotive force, but to secure the proper difference in phase between the primary and secondary currents themselves, the resistance of the circuit of the secondary is increased, so as to reduce as much as possible its self induction. This is accomplished by making the coils E of comparatively small wire, having but few turns around the cores, or by inserting in the secondary circuit an artificial resistance, R.

In practice, it has been found desirable to wind the armature with closed coils, in which currents are induced by the action of the primaries.

Oak St carhouse @ Smith ave and
Ramsey St., St. Paul

Russ, Ken Fletcher asks
"Where in St Paul is this
carbarn?
Do you know?

THE COLUMBIA ELECTRIC RAILWAY SNOW SWEEPER.

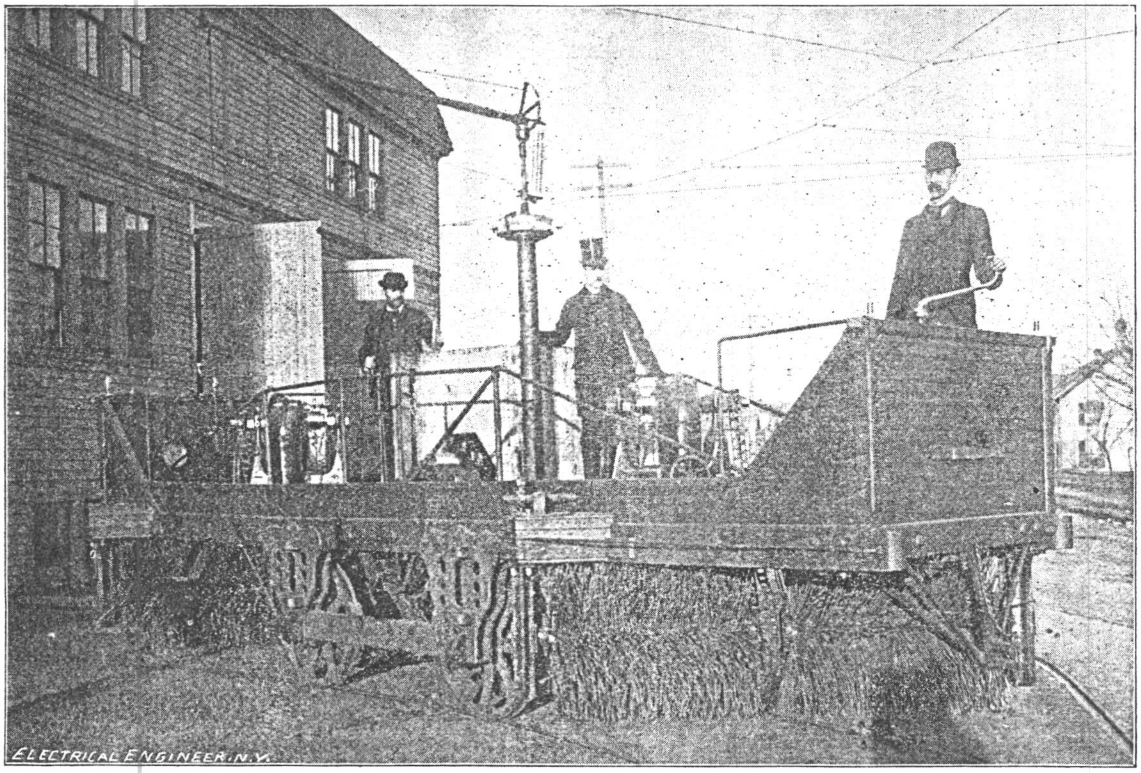
THE severe winters met with in our climate make an efficient snow-sweeper a most important adjunct to the equipment of an electric railway. As a successful example of this kind we give in the accompanying engraving a view of a new snow sweeper built by the Columbia Electric Co., of St. Paul, Minn., for the St. Paul & Minneapolis Railways.

The car-frames of the sweeper were built by the St. Paul City Ry. Co. and the motors by the Columbia Electric Co. The car is driven by one 30 h. p. laminated field, Gramme ring motor, connected by sprocket gear to the axles of the car. Friction wheels may be used, as shown in the engraving, but this is at some expense of power; the sprocket gear, however, runs with no perceptible noise. A rheostat is placed below the car bed to control this motor, and is so arranged that any speed desired can be obtained, up to a maximum of 15 miles per hour.

One 10 h. p. motor of the regular Columbia type is used to drive each brush, one rheostat controlling both motors. The brushes are run direct from the motor with sprocket and chain. The car, as shown, is open, the motors only being covered. The covers of the two smaller ones are movable, and the large one is accessible through doors.

The car is lighted with a cluster of six lights on the trolley turret, and one on each corner of the car. This is claimed to be one of the most complete sweepers thus far constructed, and will, at a speed of from 4 to 7 miles per hour, remove snow of from 3 to 12 inches deep. In case of very deep drifts the car can be run at very slow speed and the brushes at high speed, thus cutting its way through the drift.

A special advantage of this car is the placing of the motors above the car floor, which protects them from moisture and at the same time enables the motor men to take proper care of them.



COLUMBIA ELECTRIC SNOW SWEEPER, ST. PAUL, MINN.

NEWBURGH, N. Y.—At a meeting of the board of directors of the Edison Electric Illuminating Company, Mr. Charles J. Lawson was elected a director, in place of the late Mr. John P. Andrews, and Mr. Jas. T. Lawson was elected vice-president of the company, in the place of the same lamented gentleman. The company decided to extend their line underground up Second from Water street to Mortgomery and north through the latter street. It was also decided to go on during the year improving the interior of the plant of the company on Montgomery street.

PACIFIC MUTUAL TELEGRAPH CO.—The directors of this company were elected Jan. 14, among them being A. B. Chandler, D. Townsend, L. D. Parker, J. A. Corby and E. C. Platt.

FRANK TRUMBULL'S REPORT
JANUARY 18, 1893

Description of Equipment	**Mpls.**	**St.Paul**	**Total**
14 ft. single-truck, closed motor cars		13	13 (*)
16 ft. single-truck, closed motor cars		5	5 (*)
18 ft. single-truck, closed motor cars	150	84	234
22 ft. single-truck, closed motor cars	39	30	69
41 ft. double-truck, vestibuled closed motor cars	20		20
Subtotal, closed motor cars	209	132	341
18 ft. single-truck, open motor cars		9	9 (*)
24 ft. single-truck, open motor cars	60		60
34 ft. double-truck, open motor cars	25		25
Subtotal, open motor cars	85	9	94
Total motor cars	294	141	435
14 ft. single-truck, closed trailers	19	16	35
16 ft. single-truck, closed trailers	66	8	74
Subtotal, closed trailers	85	24	109
24 ft. single-truck, open trailers	82		82
25 ft. single-truck, open trailers		15	15
Subtotal, open trailers	82	15	97
Total trailers	167	39	206
18 ft. single-truck, open cable grip cars		38	38
16 ft. single-truck, closed cable trailers		34	34
25 ft. single-truck, open cable trailers		32	32
Total cablecars		104	104

Service Equipment			
Salt cars-common	20	11	31
Salt cars-automatic	13	7	20
Snow plows	22	15	37
Snow sweepers	2		2
Scrapers	9	8	17
Supply cars	2		2
Road wagons (horse-drawn, non-rail)	14	13	27
Horses	22	24	46
Horsecars	36	12	48

(*) Of these 27 cars, 22 were not available for service.

Note: Equipment used on the "Interurban" line is included in Minneapolis figures.

Electric Motor Equipments			
Sprague	109 sets	80 sets	189
Thomson-Houston	92 sets	30 sets	122
Total	201 sets	110 sets	311

Mr. Trumbull felt that the only defect was the large percentage of Sprague motors. It was his opinion that they were inferior to Thomson-Houston and Westinghouse motors and entailed considerable expense to rebuild.

A January 1892 magazine article reported that the first motors used were Sprague 15 h.p. with subsequent motors acquired being Thomson-Houston SRG motors. Troubles were experienced with the Sprague motors but the Thomson-Houston motors were much more satisfactory. Two 15 h.p. motors were used on the city cars while two 25 h.p. motors were used on the "Interurban" line cars.

A snow storm was reported on 2-27-1893 during which "ordinary plows and scrapers" pushed by strings of 8 or 10 cars removed most of the snow. This indicates that most or all of the snow plows and scrapers listed in the Frank Trumbull inspection report of 1-18-1893 were of the non-motored type illustrated in contemporary publications.

The following table is a re-arrangement of the Frank Trumbull 1-18-1893 Report to facilitate explanation of a reconciliation of the report quantities with known information.

Description	Mpls.	St.Paul	Total
1. 14 ft. closed motors (converted horsecars)		13	13
14 ft. trailers (ex-horsecars)	19	16	35
Totals	19	29	48
2. 16 ft. closed motors (converted horsecars)		5	5
16 ft. closed trailers (ex-horsecars)	66	8	74
16 ft. closed cable trailers		34	34
Totals	66	47	113
3. 18 ft. open motors (converted cable grip cars)		9	9
18 ft. open cable grip cars		38	38
Totals		47	47
4. 18 ft. closed motors (purchased new)	150	84	234
5. 22 ft. closed motors (rebuilt from 16 ft.)	39	30	69
6. 24 ft. open motors (purchased new)	60		60
7. 24 ft. open trailers (mostly ex-horsecars)	82		82
8. 25 ft. open trailers		15	15
25 ft. open cable trailers		32	32
Totals		47	47
9. 34 ft. open motors	25		25
10. 41 ft. vestibuled closed motors	20		20

The only company records on this early equipment other than this Frank Trumbull 1-18-1893 inspection report are the mechanical department record cards for the cars remaining as of 9-1-1904. These are supplemented by the bits and pieces of information gleaned from newspapers and periodicals related in these pages. The early corporate minute books also have yielded some information. The limited number of photographs available have provided some assistance. All of these sources have been examined and re-examined from differing perspectives. The results are frustrating as there are too many pieces of the puzzle missing, and too often the existing information produces inconsistencies and conflicts. The following paragraphs report the results of these various analyses.

1. 14 ft. Closed Motors	
SPCR: “most of the 14 ft. horsecars were converted to electric operation”. Some were rebuilt to 22 ft. length. These must be the unrebuilt cars.	13 cars
14 ft. Closed Trailers	
MSR: probably from the 112-136 series (Brownell 1884)	19 cars
SPCR: probably older horsecars not converted to or deconverted from electric operation	16 cars
Total	48 cars
2. 16 ft. Closed Motors	
SPCR:	5 cars
16 ft. Closed Trailers	
MSR:	66 cars
SPCR:	42 cars
Total [MSR 137-200 are 64 cars, and SPCR 129-151, 303-327 are 48 cars = 112 cars]	113 cars
3. 18 ft. Open Cable Grip Cars and Motors.	
Mostly speculation as to the car numbers.	
Selby Ave. 152-163 LaClede 1887 (deck roof) [photo of a 12 ft. 4-bench open, deck roof, grip car; no 12 ft. grip cars in Trumbull’s report.]	12 cars
Wrecked 1-27-1888 on Selby Hill	(1 car)
Selby Ave. 164-171 LaClede 1888 (deck roof)	8 cars
E. 7th St. 172-191 LaClede 1889 (railroad roof) (photo of 181)	20 cars
Selby Ave. cars converted to electric motors Feb 1890 for Grand Ave line (photo of 169)	(9 cars)
1890 US Census (7-1-1890)	30 cars
Selby Ave. extension 192-199 LaClede 1890 (railroad roof)	8 cars
Total	38 cars
4. 18 ft. Closed Motors	
MSR: 363-422, 443-538	156 cars
SPCR: 328-369, 503-527, 529-539	78 cars
Total	234 cars
5. 22 ft. Closed Motors	
MSR: 284, 569-606	39 cars
SPCR: 528, 541-569	30 cars
Total	69 cars
6. 24 ft. Open Motors	
MSR: 303-362	60 cars
7. 24ft. Open Trailers	
MSR: 201-262, 423-442	82 cars
8. 25 ft. Open Trailers	
SPCR: all of 200-216 (deck roof). 217-245 (railroad roof), plus ?	47 cars
9. 34 ft. Open Motors	
MSR: 540-547, 549-551, 555-568	25 cars
10. 41 ft. Vestibuled Motors	
MSR: 607-626	20 cars

EQUIPMENT ACQUISITIONS - 1893

The City of Minneapolis passed an ordinance 11-29-1892 requiring the use of open cars during the summer months. A March 1893 periodical reported that because of the ordinance the company had ordered 165 new open cars for May 1st delivery:

- 105 cars from American Car Company;
  - 25 cars to be 40'3" long for the "Interurban" line;
  - 80 cars to be 27'9" long for Minneapolis lines; and
- 60 cars from LaClede Car Company to be 27'9" long for Minneapolis (sic) lines.

Another article stated that orders were placed for 85 open cars and 30 new cars for the "Interurban" line. A June 1893 periodical reported that the company had purchased 60 more W.P. 50 motors (30 two-motor sets) from General Electric Company to go under some recently received cars from St.Louis.

According to the mech. dept. record cards as of September 1, 1904, we know that the following cars had been ordered and received.

- 80 cars, MSR #627-#706, American Car Co. 1-19-1893, 27 ft. 8-bench open, single-truck, deck roof,motor cars. (There were no record cards for 15 cars, #692-#706.) order # 36
- 25 cars, MSR #707-#731, American Car Co. 1-6-1893, 40 ft. 13-bench open, double-truck, deck roof, motor cars. order # 35
- 65 cars, SPCR #570-#634, LaClede Car Co. 1-19-1893, 28 ft. 8-bench, open, single-truck, deck roof, motor cars. Note these were assigned numbers in the St.Paul series indicating they were intended for operations in St.Paul. order # 307

A July 1893 periodical reported that the open cars being built for Minneapolis and St.Paul had eight benches, a center aisle, large platforms, deck roofs, and were painted light green.

Frank Trumbull's Second Inspection
June 9, 1894

In his inspection report he stated that 203 additional carbodies and 30 additional car equipments (sic) had been purchased since his last report in January 1893.

The foregoing orders total 170 cars, a difference of 33 cars. Three cars may have comprised the two cars acquired by the Minneapolis Land & Investment Company (August 1893 magazine article: "Minneapolis St. Ry. was further improved by the addition of handsome new vestibuled cars for the St.Louis Park line.")(Thomas Lowry owned stock in the company.) and the one Northwest Thomson-Houston Co. Northern-built "test car" #540. Thirty additional open cars would have had to numbered in the SPCR series, #635-#664, but not a single shred of evidence has turned up to support this. We can, however, identify 30 service cars (snow plows #1-#20, wire cars #1-#2, oil car #1, wreckers #1-#3, work cars #1-#4) but the mech. dept. record cards on these cars do not contain dates built or acquired. Or it is possible Mr. Trumbull made a mistake and added 30 carbodies to the 170 to compensate for the 30 additional car equipments.

Use of the Open Cars

189? periodical: 200 open motor cars are to go on these (Minneapolis)lines: Camden, 20th Ave. N., Plymouth, Emerson, Minnehaha, 1st Ave. S., Lake Harriet and Interurban. The Interurban and Lake Harriet lines use single motor cars, the new 34 ft. ones; the other lines add either open or closed trailers.

gine, built by the E. P. Allis Company, furnishes the power. This engine has been run continuously for over three years, and has never been shut down but once for repairs, thus having a most excellent record. The same is true of the boilers. In fact, wherever we go, we find that the Hazelton boilers are giving good satisfaction.

TRANSFERS AND TICKETS.

Transfers are given over connecting lines of the same system. The transfer tickets (Form A) are printed in three colors to designate the different lines. The issuing conductor punches the month, day and hour, and retains the coupon, which has no value, but which he returns to the receiver's office and gets new transfer tickets for it. The receiving conductor registers the transfer the same as a fare. By this arrangement there can be no collusion between conductors for an improper use of transfers; the ticket cannot be used the second time and cannot be duplicated. The regular fare is five cents, or twenty-five tickets for $1; childrens' tickets three cents. There are also employes' tickets, and complimentary tickets are issued to policemen, aldermen and city officials.

(FORM A.)

A. M. 1 2 3 4 5 6 7 8 9 10 11 12 P. M.
1 31
2 DEC. **MILWAUKEE ELECTRIC R'Y CO.** JAN. 30
3 1892—TRANSFER CHECK—1893. 29
4 FROM VLIET STREET LINE TO 28
5 NOV. 18TH STREET LINE. FEB. 27
6 26
7 Good only at or within one block of 25
8 OCT. Corner of Vliet and 18th Streets and on MAR. 24
9 date indicated by punch marks and within 1 hour from time punched. 23
10 11 12 13 14 15 16 17 18 19 20 21 22

Milwaukee Electric Railway Co.
TRANSFER COUPON.
FROM VLIET STREET LINE TO
18TH STREET LINE.

The conductors and motormen exchange duties, alternating every two weeks from conductors to motormen, and *vice versa*. The conductors and motormen are also required to spend three nights a week in the repair shop till they become familiar with every electrical detail.

This line has been operating for some time at a loss, and is now in the hands of a receiver. G. J. Melms, formerly general manager, is acting as receiver. The road is soon to be sold on foreclosure proceedings, and will probably be absorbed by the Milwaukee Street Railway Company's system.

Minneapolis and St. Paul.

The "twin cities," so called, although ten miles apart, with their combined population of 350,000, offer an inviting street railway field, which is well occupied; and, as may be expected, from the reputation of the men at the head of the rapid transit companies, the service is most admirable. In fact, in many respects the service is superior to any that we have before found in our tours of observation. In making the rounds of repair shops, power stations, car barns, storerooms and even on the cars, it was noticed that a condition of scrupulous cleanliness prevailed. There was no scrap or dismantled motors lying about for the workmen to stumble over, but there was a place for everything (even for dirt and scrap) and everything was in its place. After repeated inquiry as to who was responsible for this condition of affairs, it was learned that the president, Thomas Lowry, and Vice-President C. G. Goodrich, had *indicated* their preference for order and neatness in all the departments, and every foreman had become imbued with the same spirit. At any rate these things were in striking contrast to the condition of affairs on some other lines, and as the service on these lines was equally efficient in every direction, it may be inferred that the success of any management can be measured quite accurately by observing these particular points.

On arriving in Minneapolis and calling at the company's office, we were cordially received and handed transportation books, good on the lines of both cities, and one of the heads of departments was detailed to accompany us on our rounds to the power houses and over the lines.

TRACKS.

The lines of the two cities embrace 250 miles of single track, of which ten miles are operated by cable and the balance by electric power. The tracks are laid in part with seventy-eight pound, six inch girder rail, spiked direct to the ties, and a sixty pound, five and three-quarters inch T rail of special design, joined with long and deep splice bars. Tracks laid with the T rail give the best satisfaction, and this has been adopted as the standard and is being laid on the paved streets as well as on the suburban lines. While there has been no special ordinance allowing the use of T rails on the paved streets, the city authorities do not object to their use, and they are also acceptable to the general public as they do not interfere with vehicular traffic. The rails are laid on wide hewn ties, spaced two feet apart. An inch board is placed above the ties on which the paving rests, and an inch strip is placed on the inside of the rail to provide a space between the T rail and paving for the wheel flange. The importance of using wide ties was strikingly illustrated by an experiment made on the interurban line between Minneapolis and St. Paul, where T and girder rails were laid upon six inch sawn ties, but the track went down, the ties sinking into the soil, so that it became necessary to relay the track with wide hewn ties, which were laid close and thoroughly tamped, and the girder rails replaced by T rails. The joints, however, on this line need constant attention, and are a little low in some places. In both cities a number of the electric lines converge to one point and make a common loop over which most of the cars pass. From the common center the cars are dispatched at proper intervals.

CARS.

Nearly 700 cars are operated on these lines, including the summer equipment. 100 of these are eighteen foot cars, manufactured by J. M. Jones' Sons. Sixty open and sixty closed cars were manufactured by the Laclede Car Company, and a large number by the Northern Car Company.

The twenty interurban cars were manufactured by the American Car Company. These are vestibule cars, forty-one feet over all, with seats for forty-three persons. These cars are equipped with rattan cross seats, and are very highly finished. They are run always with the same end forward. The forward vestibule is a cab for the motorman, and the Spear heater, with which the car is warmed, is placed in the forward partition, so that the cab is warmed as well as the interior of the car. The rear vestibule is closed on one side, so that the passengers enter at the corner, circular steps being provided. Owing to the extreme cold weather, the company has found it necessary to put in a double floor and double windows in these cars, which make the long (fifty-five minutes) trip between the two cities. The window curtains on these interurban cars are mounted on ordinary rollers, but are held in any position by means of adjustable rubber tips at the ends of the curtain stick, which engage with the face of the slide in the posts. By means of clips on the under side of the hollow curtain stick the rubber tips are freed from contact with the slide, and the curtain may be raised or lowered. This device is manufactured by the Burrows Car Shade Company of Portland, Me., and it is a very desirable street railway appliance.

TRUCKS AND WHEELS.

The interurban cars are mounted on the Bemis No. 29 pivotal trucks, which are giving excellent satisfaction; some of them, however, have been changed from side to center bearing. Bemis trucks are employed, for the most part, on all the cars. In some cases the trucks have been remodeled, and the spring base extended to suit the particular cars and conditions to which the trucks are subjected. This type of truck is in high favor with the management.

A thirty-three inch wheel has been adopted as the standard, after experiments made with the thirty and thirty-six inch wheels. The latter were particularly hard on the axles, resulting in a number breaking while rounding curves.

The Allen paper wheel is employed on most of the double trucks, while five of the interurban cars are equipped with the cushioned wheel manufactured by the Cushion Car Wheel Company, of Indianapolis. The cast wheels are mostly of Whitney's make, while some were made by the Northern Wheel & Foundry Company, of St. Paul, this company having recently moved from Milwaukee to St. Paul.

MOTORS.

The interurban cars are equipped with two twenty-five horse power, Thomson-Houston motors. The other equipment consists, for the most part, of the Edison double reduction, fifteen horse power motors. There are, however, a few double reduction, Thomson-Houston motors, and some of the W. P. type, of twenty-five horse power. The latter are giving the best satisfaction. The double reduction motors have nearly all been made over in the company's shops, and are operating with a higher efficiency and with less repairs, than formerly. The winding of the fields has been changed, and a larger armature shaft has been substituted.

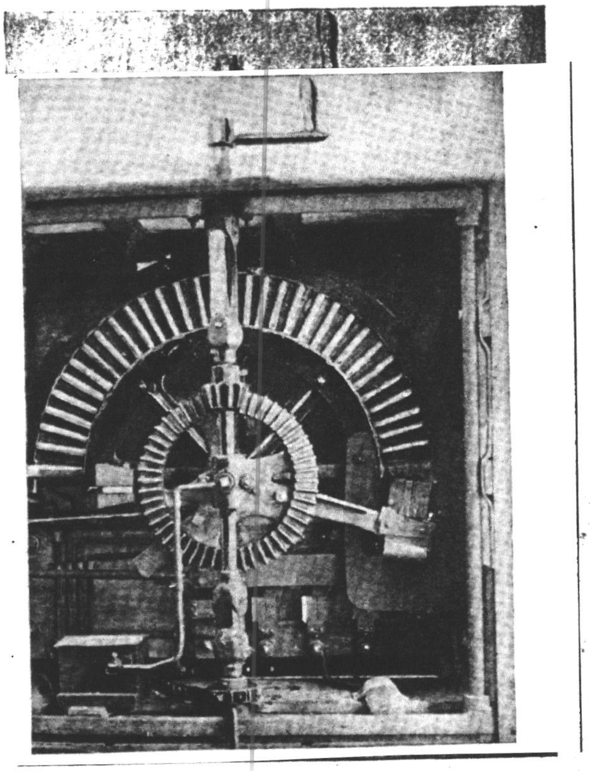


FIG. 1.—PLATFORM RHEOSTAT—MINNEAPOLIS.

Considerable saving has been effected in rheostat repairs by boxing it in on the front platform against the dash, as shown in Fig. 1. In this position it is not exposed to moisture, and is readily accessible for repairs. The brush is operated by a handle on the top of the box, and motion is communicated to the brush by means of a vertical shaft and beveled gear. The extremities of the shaft are of wood and are joined to the iron portions by a thimble and key or rivet. A sprocket wheel on the lower end of the shaft transmits, by means of chain and cable, motion to the rheostat on the rear platform. The reversing switch handle is to the left, not shown in the figure. This arrangement is working very satisfactorily.

POWER STATIONS.

The electric lines are operated from three power stations, two being located in Minneapolis and one in St. Paul. The cable lines are operated from two stations in St. Paul. The main station, from which the Minneapolis lines are operated, is on Third Avenue North, and in the same building are the company's offices and the car repair shop. This station was illustrated in our September, 1891, issue, and, as will be remembered, the power equipment consists of seven boilers, two of which are of the Stirling type and five of Babcock & Wilcox make. Oil is burned for fuel. There are two 1,200 H. P., triple expansion engines and one 300 H. P., all of the E. P. Allis Company manufacture.

Cracks having recently developed in some of the spokes of the flywheel of the small engine near the rim, it has been found necessary to replace it with a heavier wheel. While this engine is idle the station is without any reserve power, as both the larger engines are in continuous operation. The engines are coupled by belting to a countershaft beneath the floor, from which belts transmit the power to the sixteen 175 K. W., Edison generators. The belting was manufactured by W. S. Knott & Company, of Minneapolis.

The engine room is light and airy, the ceiling which formerly covered it having been removed, leaving it open to the roof. This was rendered necessary in order to secure sufficient ventilation for the machines. This will serve as a hint to others in planning power stations. There should be plenty of head room for ventilation and light.

The switchboard of this station is located near the middle of the room, and is divided into three sections, which make an obtuse angle with each other, and so arranged that the attendant can see all the switches and meters from his desk in front of the middle board. All the feeder switches are placed on the middle board and the line switches on the other two. The cables are all carried beneath the floor. It is the intention of the chief electrician, A. W. Morrell, to so arrange the circuits that any one of the generators can be coupled direct to any of the lines, so that when necessary a higher voltage may be employed on any individual line.

The generator room is equipped with a traveling crane for handling the heavy parts, and there is also a lighting generator of the Excelsior type, which operates 100 arc lamps of 2,000 C. P., and a large number of incandescent lamps which light the stations, car barns, repair shops and offices. The output of this machine is regulated with a very ingenious governing device, and the generator is operating with great satisfaction. There is a second machine of the same type in No. 2 power house, and by means of specially designed switchboards the lights may be run by either one or both of the generators. A simple and ingenious device was noted on the lighting generator for conducting the static electricity generated by the belts from the fields to the earth. This consists of a strip of cardboard four or five inches long, clamped between the field and the ground wire, on which is a lead pencil mark, which contains sufficient carbon to conduct away the troublesome current.

No. 2, or the 31st Street power house, is illustrated and described on page 105.

REPAIRS AND RENEWALS.

Since the company began operating with the Edison equipment, two years ago last October, the company's engineers have made important changes in generator armatures, and in the motors. All the generator armatures have been remodeled and rewound. The commutator bars have been lengthened, and the construction of the core has been materially changed, so that the tendency to heat has been reduced, and not a burn-out has occurred since the changes were made. The same is true with the double reduction motors. A larger shaft has been substituted, the gear reduction has been changed from twelve to one, to nine to one, the winding of fields has been changed, and the motor is now working satisfactorily, with a good degree of efficiency, and a minimum of expense for repairs. Rawhide is used principally for armature pinions, and bronze intermediate pinions are employed.

Some of the improvements in overhead appliances consist in providing a drop forged steel ring for the bell hangers, so that they do not break, as formerly, and the substitution of a trolley splice which was invented by the general manager, W. J. Hield. Material for overhead repairs is issued on a requisition made by the foreman and approved by the electrical engineer; and the foremen, in their daily reports, are required to make returns for the old material, the value of which is credited to the supply department. Formerly the workmen took possession of the old material, which they sold to junkmen, resulting in quite a loss to the company, a deal which the new arrangement corrects.

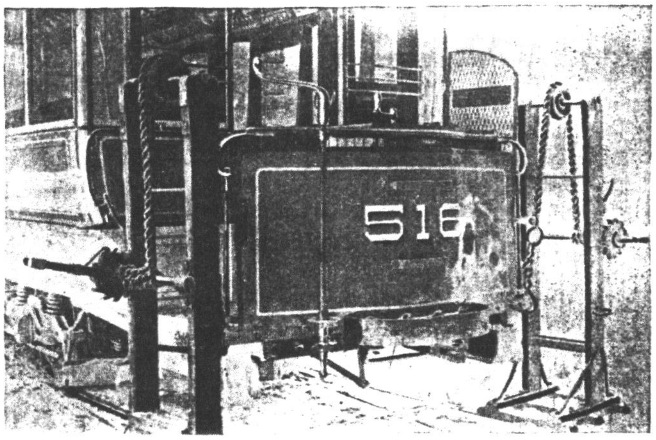


FIG. 2.—CAR JACK—MINNEAPOLIS.

REPAIR SHOPS.

The car repair shops are located at the Third Avenue station, and the iron shops are at the 31st Street station. The former are conveniently arranged with a good equipment of wood working tools, mostly of Fay's manufacture, which are located on the ground floor, and operated by power from the main station. The carpenters' benches, erecting and paint shop are on the second floor. The carpenters' benches are arranged parallel to each other, to one side of the shop, and system, order and cleanliness prevail, as before noted. A very convenient jack for raising the ends of cars is employed in this shop, and is illustrated in Fig. 2. One man can move and operate them, and they are frequently employed on the line for handling disabled cars. The Third Avenue station, including the car shop and offices, has recently been equipped with the Grinnell dry pipe, fire sprinkling system, having 1,041 sprinklers. The water is taken from the city mains which carry sixty pounds pressure, and this is supplemented by a steam pump and reservoirs.

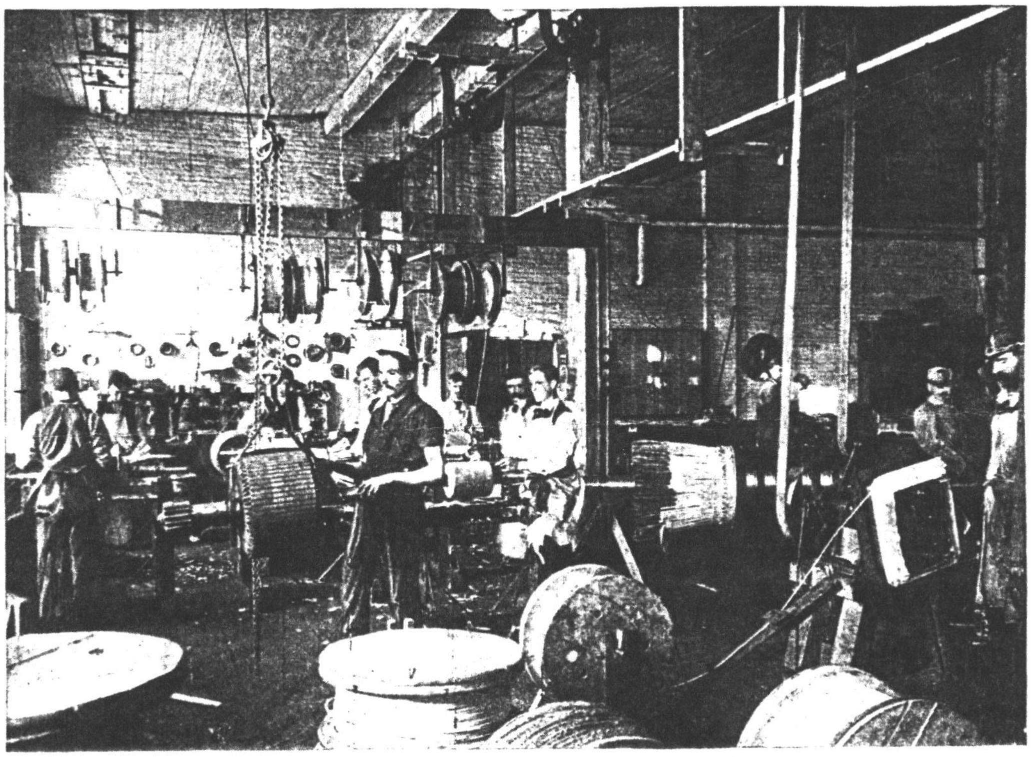


FIG. 3.—WINDING DEPARTMENT OF REPAIR SHOP—MINNEAPOLIS.

The iron shops are more extensive (150 × 125 ft.) and better equipped than any which we remember to have seen. Among the tools we note three Gould & Eberhardt gear cutters with flexible shafts, one planer, two shapers, six drill presses, twelve lathes, emery grinders, two milling machines, a special turret nut machine, a wheel boring machine, two wheel presses, one key seating machine, axle lathes, etc. A large tool room is railed off in which are a number of special machines for making the cutting tools and drills, and the whole arrangement is modeled after the practice of large manufacturing establishments, giving facilities for the manufacturing of armatures complete, and repairs of nearly every street railway appliance. A brass foundry has recently been added, having a daily capacity of 1,000 lbs. of metal. About fifty men are employed regularly in the repair shop and twenty-eight in the winding department, a view of which is shown in Fig. 3.

The blacksmith shop adjoins the repair shop, and the equipment consists of one Bradly hammer, one steam hammer, seven forges, and a number of small tools.

The trolley poles, which are of ash, are here manufactured. The conducting wire is spirally wound about the pole, giving sufficient length for splicing when necessary.

STOREROOMS.

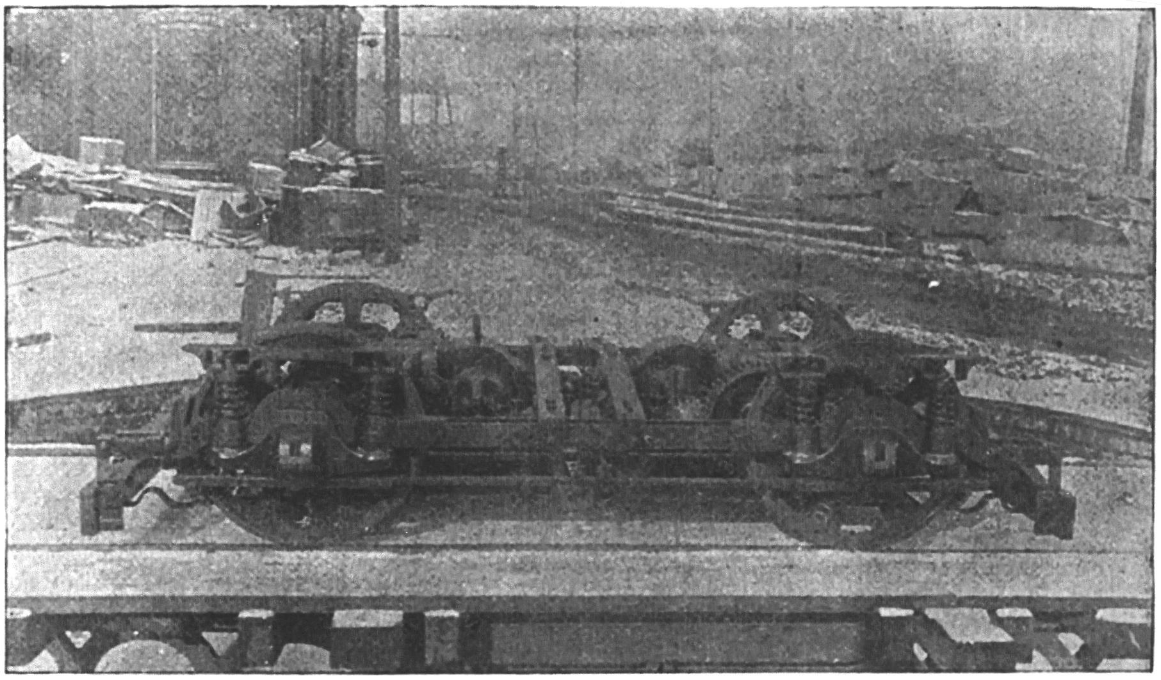
The 31st Street station is built on three sides of a block, and that portion fronting on 31st Street is three stories in height and is occupied as offices by the material accounting department and storerooms. The heavier material, such as wire reels, wheels and fields, is stored on the ground floor, while the second and third floors are utilized for the lighter parts. The rooms are equipped with rows of double shelving and bins, thus providing for the classification and housing of the almost endless number of parts. The amount of surplus stock carried by this company is surprising. It is in fact equal to that carried by some of the electrical supply companies. The rooms are warmed by steam heat, and there are elevators and every appliance for the convenient handling of stock. It is needless to say that they are models in their way.

TRANSFERS.

Nearly all the Minneapolis lines converge to one point, most of the cars passing over the loop, from which point they are dispatched by special agents. Transfers are given on nearly all the lines, and for this purpose agents are stationed at three or four different points for the purpose of issuing transfer tickets. These tickets are punched for the purpose of indicating the day and hour of issue, and are limited to a brief period. At each of the transfer stations small circular booths are erected on the sidewalks near the corner, for the convenience and comfort of the agents. These are provided with a stove, clock, table and other conveniences, and some of them are

Improved Double Motor Truck.

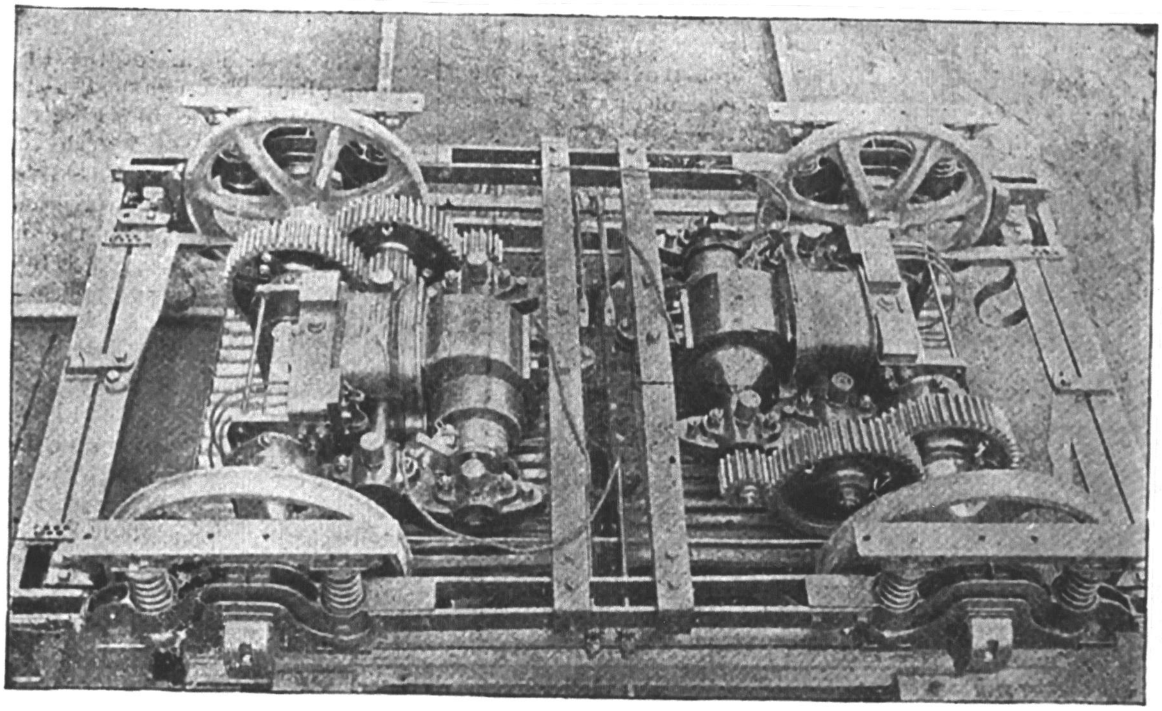
The accompanying illustrations show a new improved double motor truck designed by the Thomson-Houston Co. for use with their new motors, and which, as may be seen, has many points of excellence. The truck is equipped with the Bemis gear and is of channel iron, very substantially made, and so arranged that every part is easy of access. Especial attention has been paid in its design and construction to facilitate the removal of any of the parts that are subject to wear, including the armature and the wheels.



THOMSON-HOUSTON MOTOR TRUCK WITH BEMIS GEAR.

The arrangement of levers is simple and effective, and the car body can be readily attached or removed. The motor is shielded from the truck by means of corrugated metal pans, and is provided with an elastic support attached to the arched cross bars in the middle of the truck. The gear connection between motor and car axle and the arrangement of springs are clearly shown in the illustrations.

◆



THOMSON-HOUSTON MOTOR TRUCK WITH BEMIS GEAR.

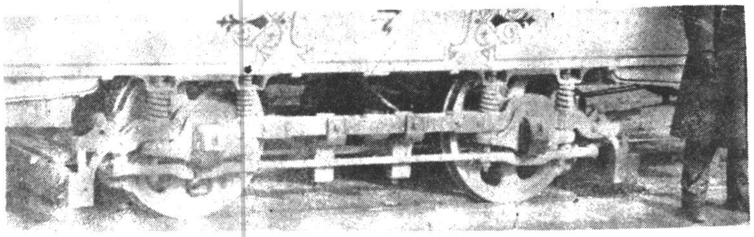
Bemis Single Trucks

Three Designs

Thomson-Houston truck with Bemis gear was manufactured by Bemis for Thomson-Houston during 1890.

Eight springs and tie bars, two springs on each side of each journal box. See photos of MSR 395 and 477.

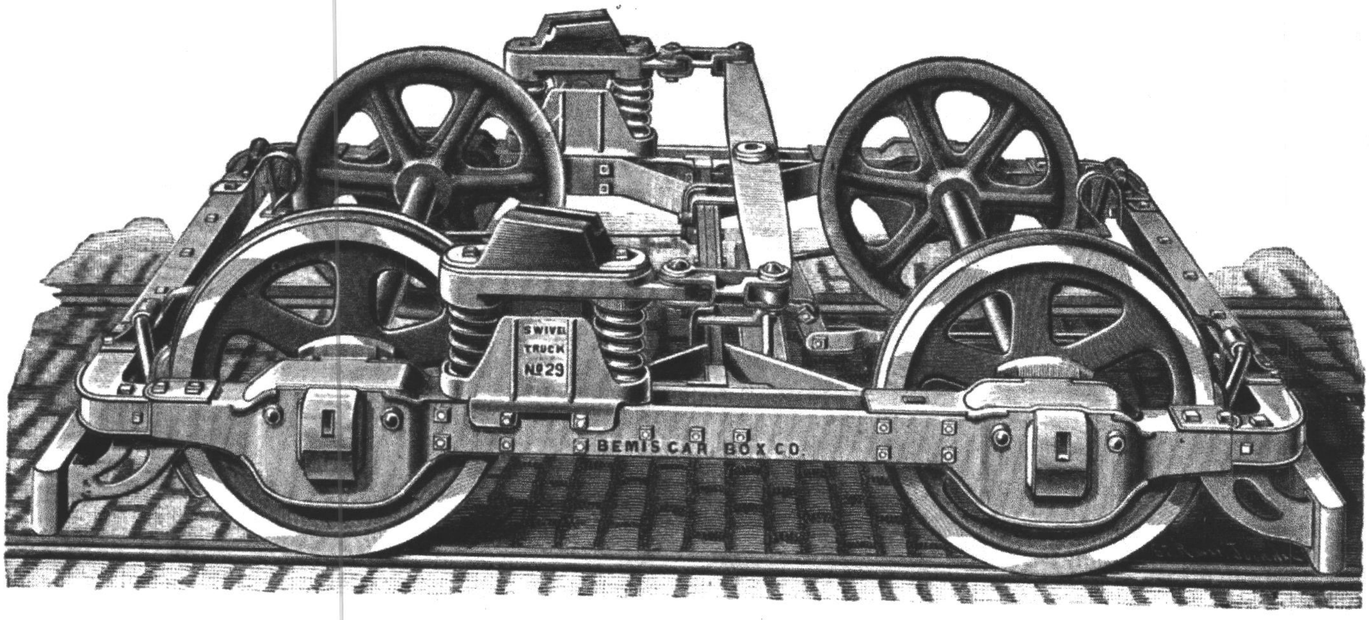
Twelve springs, two springs on each side of each journal box as above, and one spring on each end of each end frame. Looks as if new journal box frames replaced the old journal box frames, bolted to the side frame. Improved riding characteristics? See photos:
MSR 403, SPCR 407: retained the old angle braces.
MSR 463,507,600;SPCR 1539.
SPCR 559, a 22 ft. rebuild, appears to have twelve spring truck, and has truss pipes as used on the open cars.



THOMSON·HOUSTON MOTOR TRUCK WITH BEMIS GEAR
Constructed by Bemis in 1890.

New Swivel Truck, No. 29.

The accompanying engraving illustrates a new swivel truck, No. 29, for eight wheel cars, designed and built by the Bemis Car Box Co. of Springfield, Mass. The truck has a short wheel base and swivels from its centre, but carries a large per cent. of the weight of the car on the motor axles, and while giving increased traction on the motor wheels, has standard sized wheels on both axles. This gives light draught and good braking qualities without increasing the height of the car above the track. Another important feature is the fact that there is no part of the truck over the motor, permitting of easy access to the latter for inspection, dismounting or making repairs.



NEW BEMIS STREET RAILWAY TRUCK.

EQUIPMENT MODIFICATIONS 1893-1896

Rheostat Controllers

The original electric motors were controlled by Thomson-Houston rheostats (1892 rulebook), the rheostat being mounted under the car floor and connected by sprocket and chain to the controlling stand and handles located on the front platform. Cars #607-#626 were received in mid-1892 with what was termed a TCRT series-multiple controller, which apparently was the device described in detail in a February 1893 issue of the Street Railway Journal, [redacted] photocopy appended. It was reported in October 1893 that TCRT shops began improving this arrangement so that trucks and motors could be changed from open to closed cars, and vice versa, without delay. The article reported that the rheostat was moved to the front platform and enclosed in a large box which also contained the resistors, fuse boxes and switches. This also made the equipment more controllable and less subject to danger from burning.

Motors

An 1892 rulebook summarized the types of motors then in use. Sprague, one type, with two field coils in series. Thomson-Houston three types, SRG 30, DRG 30 and SRG 50 with two field coils in parallel. The Sprague motors which Frank Trumbull found deficient were all rebuilt, the last motor being completed in June 1894.

> "Since the company began operating with the Edison equipment two years ago last October, the company's engineers have made important changes in generator armatures and in the motors. All the generator armatures have been remodeled and rewound. The commutator bars have been lengthened, and the construction of the core has been materially changed so that the tendency to heat has been reduced, and not a burn-out has occurred since the changes were made. The same is true with the double reduction motors. A larger shaft has been substituted, the gear reduction has been changed from 12:1 to 9:1, the winding of the fields has been changed, and the motor is now working satisactorily with a good degree of efficiency and a minimum of expense for repairs. Rawhide is used principally for armature pinions and bronze intermediate pinions are employed."

SRG = single reduction gear
DRG = double reduction gear
W.P. = water proof

A motor "equipment" consisted of two motors for the single truck, or one motor in each double truck, and the number in the model type referred to the combined horsepower of the two motors. SRG 30 comprised two 15 h.p. motors, SRG 50 comprised two 25 h.p. motors, and W.P. motors were 25 h.p. each. (W.P. 50).

Some mech. dept. record cards have a notation on SRG motors: "#11 winding of armature and field SRG 25".

From Street Railway Review Articles

Thomson-Houston F-30/Sprague #6 1890: DRG, 15 h.p., geared for 12.5 mph, total weight 1,994 lbs.; Nov 1894
Thomson-Houston SRG 30 Late 1890: 15 h.p., geared for 12.1 mph, total weight 2,120 lbs.; Nov 1894
    Sep 1898: gear ratio 14:67, 2,275 lbs. complete (gear and case was 300 lbs.)
Thomson-Houston W.P. 50 1891: 25 h.p., geared for 12.5 to 19 mph, total weight 2,183 lbs.; Nov 1894
    Sep 1898: gear ratio 14:67; 3,280 lbs. complete (gear and case was 347 lbs.)

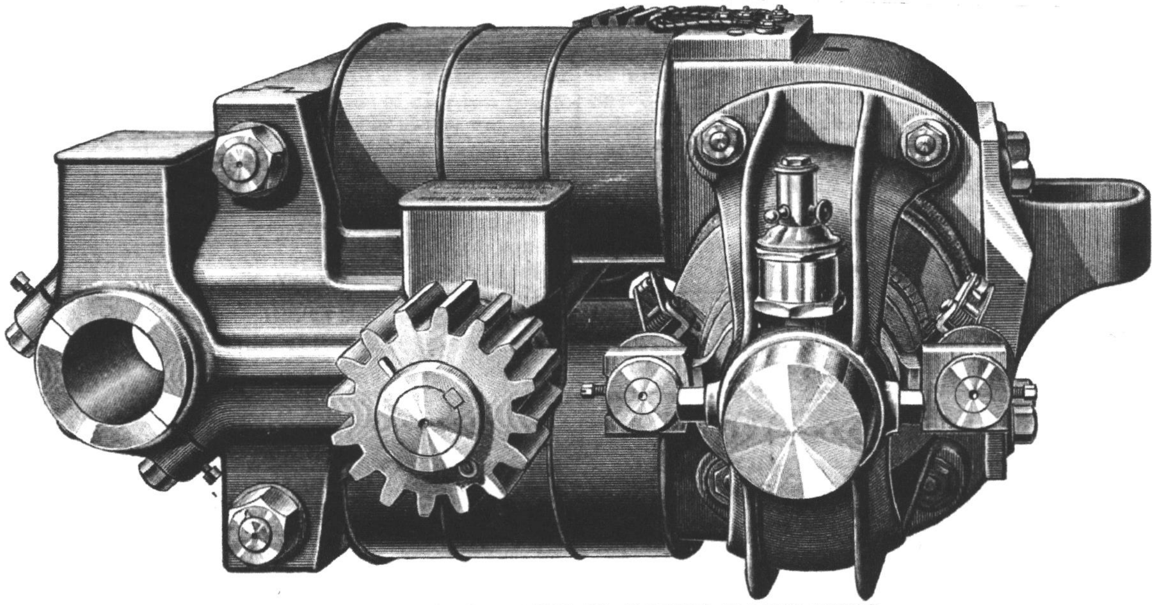
DATA OF MOTORS
11-16-1894

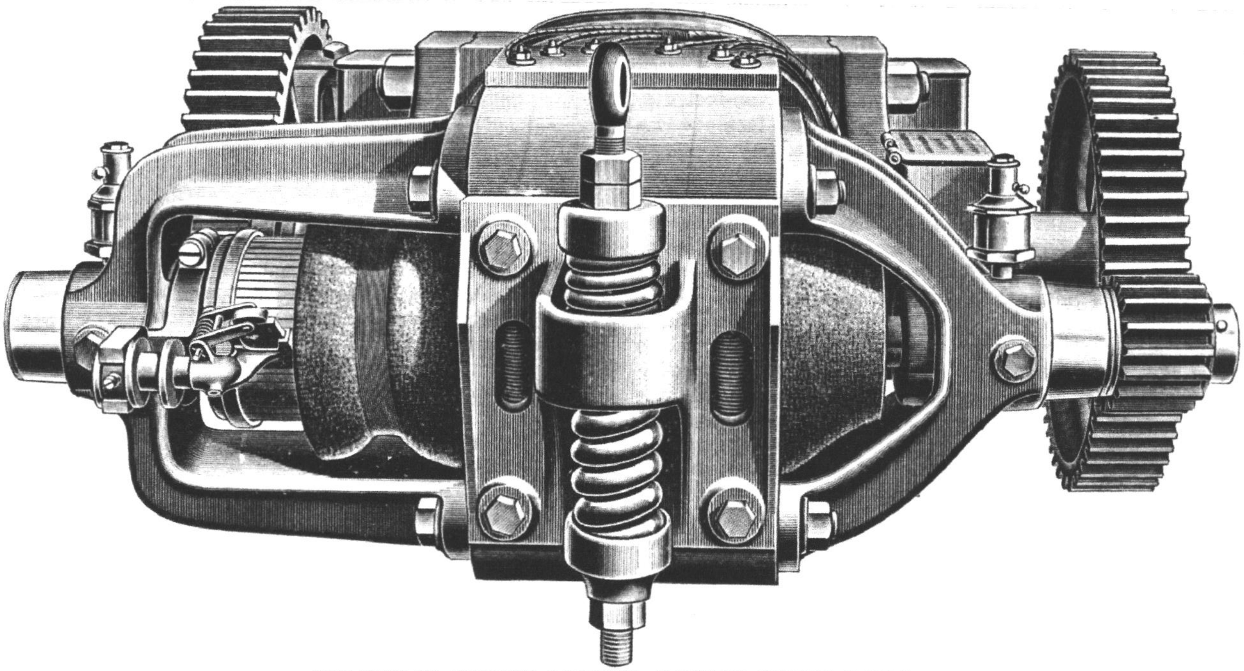
Name	Style	Date	Weight*	Gearing
Thompson-Houston	~~SRG~~ DRG F30			
	Factory Type	1889		15:49/17:49
	#11 Wire Fields	1892		" "
	#7 Wire Fields,#11 Armature	Nov 1893		" "
	#7 Wire Fields,#11 Armature	Jun 1894		" "
Thompson-Houston	SRG 30			
	Factory Type	1890	2,100	14:67
	#11 Wire Field	1891	2,100	"
	Bast.#13 Armature	1891	2,100	"
	#12 Wire Armature	1892	2,100	"
	#6 Field,#11 Armature	1893	2,100	17:64
	Special	8-20-1894	2,100	"
Thompson-Houston	SRG 50			
	Factory Type	1890	2,100	14:67
Sprague #6				
	abc Fields	1890		17:64/16:50
	abc Fields,#12 Wire	1891		" "
New Sprague		1892	1,625	21:60/16:50
W.P.				
	Factory Type	1892	2,400	14:67
	First Smooth Core	May 1893		17:64
	#6 Wire Armature	Aug 1893		"
	#3 Wire Field	Nov 1893		"
	#7 Wire Armature	Dec 1893		"
	#6 Wire Armature	Dec 1893		"
	2 Top Poles,#6 Wire Armature	2-3-1894		"
	L.W. Little Whale	2-4-1894		"
	SRG S.R.G. Armature	1-22-1894		"
	Factory Outside Commutator with Lower Coil	3-6-1894		"
	3 Motor Equipment by T-H People	3-20-1894		

* Motor without axle gear.

Thompson-Houston Generator M.P. 250
Edison Generator 175 KW
Bain Generator

SPRAGUE #6 MOTOR
SRJ AUGUST 1889


SIDE VIEW OF SPRAGUE IMPROVED ELECTRIC RAILWAY MOTOR.


END VIEW OF SPRAGUE IMPROVED ELECTRIC RAILWAY MOTOR.

THE STREET RAILWAY JOURNAL

113 LIBERTY ST. N.Y.

Vol. VII. *NEW YORK & CHICAGO, FEBRUARY.* *No. 2.*

New Single Reduction Gear Motor.

For about a year past it has been an open secret that the Thomson-Houston Electric Co. were experimenting with a new slow speed motor for street railway service, but not till the present, after long and severe tests, have they felt justified in putting it upon the market.

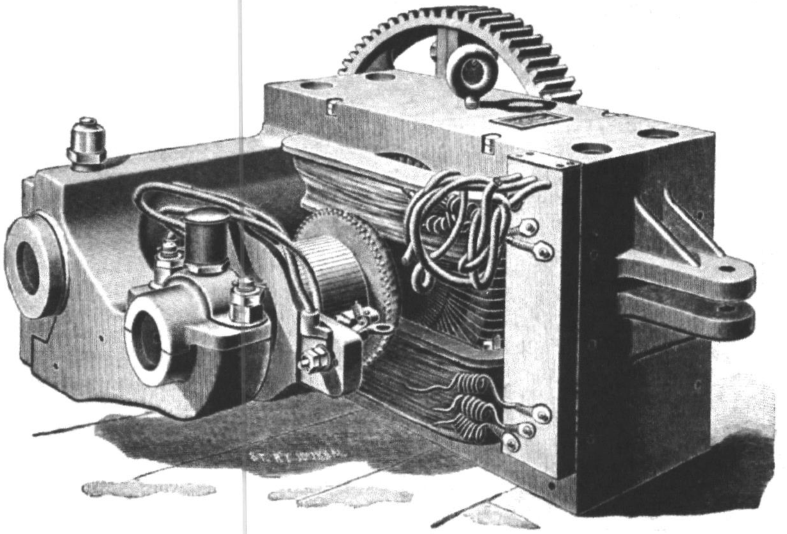


FIG. I.

This new machine illustrated herewith, has been named the S. R. G. motor and these mystic letters, which are interpreted by the above heading, are destined to have a prominent place in electric literature, for the motor, doubtless, marks a new era in street railway traction.

The photographs from which our engravings were produced we obtained on a recent visit to Boston and Lynn where we had the privilege of inspecting the S. R. G. motor, studying the details of its manufacture, and also of a ride on a West End car (No. 120) equipped with two of these machines.

The operation of the gear is practically noiseless, and the tests show that the motor is more powerful in driving the car than the double reduction high speed motors with the same current.

As will be noted from the illustration, Fig. 1, the motor is nearly iron clad, having two internal pole pieces of ample spread carrying two field spools which partially surround the armature core, on the same principle as the well known arc dynamo originated by Professor Thomson. The magnetic circuit is completed on the front end of the motor by the nose plate, and on the back end by the frame, on which are cast the axle boxes and arms, which serve as a support for the armature shaft bearings, Fig. 2. The armature is of the Gramme ring type, and the bobbins are wound close together around the entire rim, Fig. 3; one great advantage of this construction is the fact that any coil can be easily rewound without disturbing its fellows, while with the drum armature in the type of motor formerly used by the company and still largely used by others, the winding all had to be renewed down to the injured coil.

The brushes are placed exactly opposite and in a horizontal, fixed position. There seems to be no sparking under the ordinary running conditions and the brushes are easy of access.

The field spools are protected on all sides by the fields and frame. The gears are entirely enclosed in a dust and oil-tight case, which is provided with a hand-hole closed by a spring cover, Fig. 4, permitting ready examination of gears and the introduction of lubricants.

A sheet iron pan, Figs. 2 & 4, extending above the centre of the armature shaft entirely encloses the bottom and sides of the motor and protects the armature and commutator from dust, snow and water. The advantage of this casing was strikingly demonstrated during the recent snow storms, the S. R. G. coming through unscathed while some of the fields on the old style of motor came to grief from the effects of excessive moisture. This pan has a sliding bottom and is attached to the motor in such a manner as to permit of being readily removed for access to the various parts.

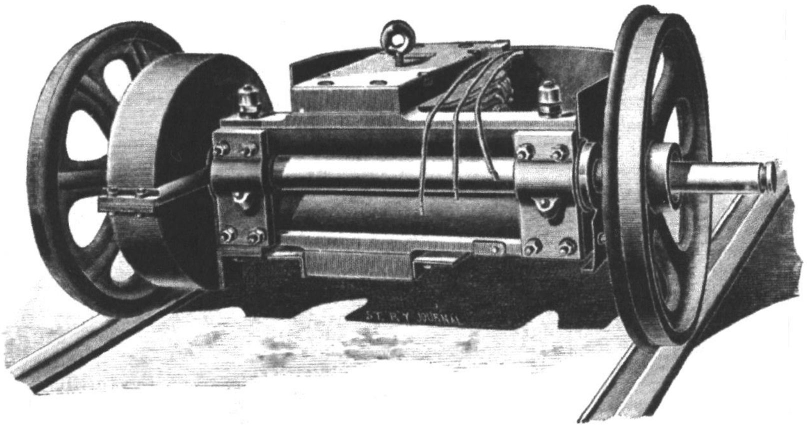


FIG. 2.

The motor when mounted on a truck with thirty-inch wheels is designed to clear the top of the rails four inches, Fig. 5.

The spur pinion on the armature shaft is of steel, four and a half inches face, and has fourteen teeth, three pitch. The split gear on the car axle is of cast iron with the same width of face, and has sixty-seven teeth, Fig. 1

The speed of the armature shaft relative to that of the car axle is nearly 4.8 to 1, and when the car is running ten miles per hour the armature makes 538 revolutions per minute, or the speed of the armature is 53.8 turns per minute per one mile per hour.

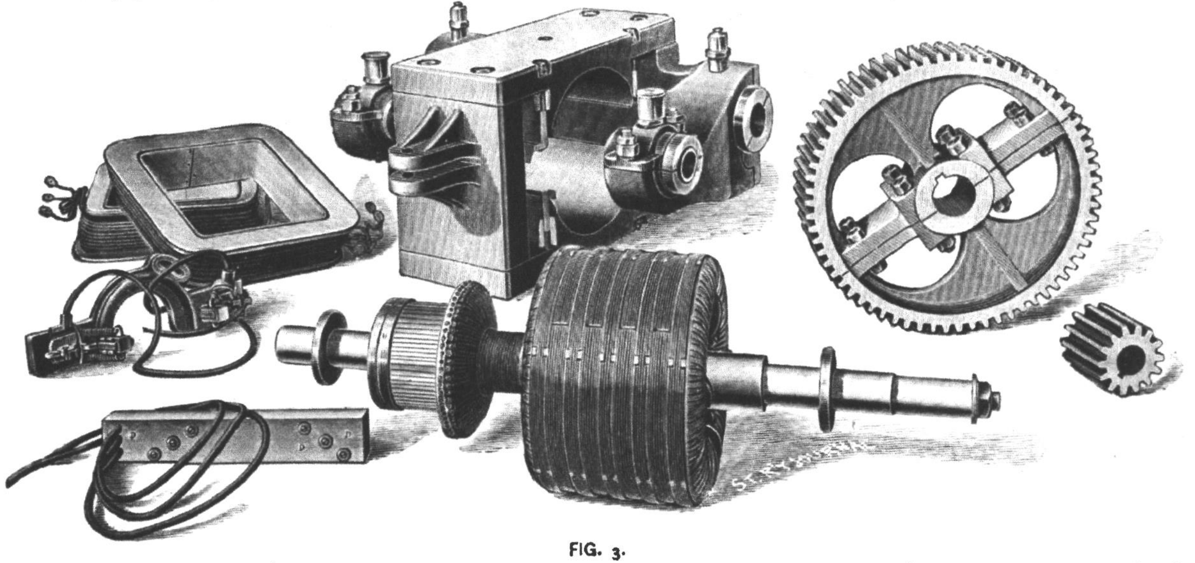


FIG. 3.

The item of repairs on gear will be greatly reduced in comparison with the old type of motor, from the fact that the single reduction corresponds only to the intermediate pinion and axle gear wheel, and has the advantage of being boxed to run in oil.

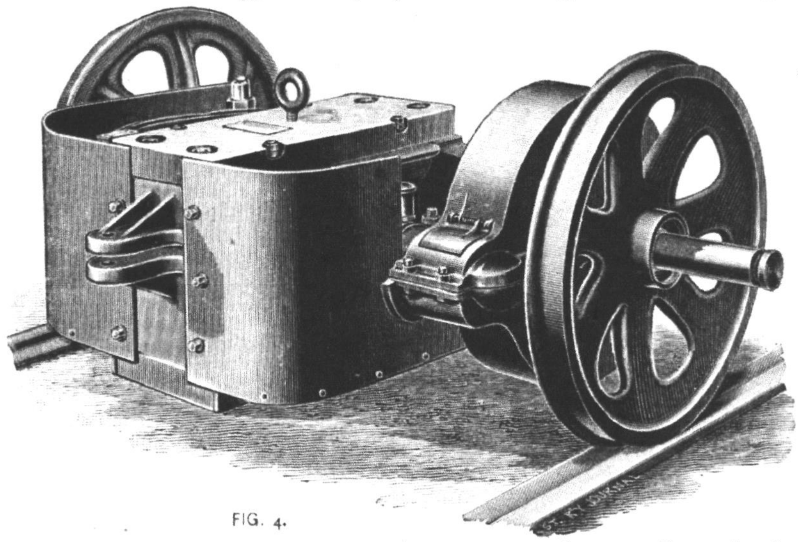


FIG. 4.

The facility with which the armature can be removed simply by lifting the upper field, the ease with which an armature bobbin can be rewound, less liability to damage from centrifugal action, such as bursting of binding wires, displacement of coils, breaking of commutator connections, all insure a minimum amount for repairs.

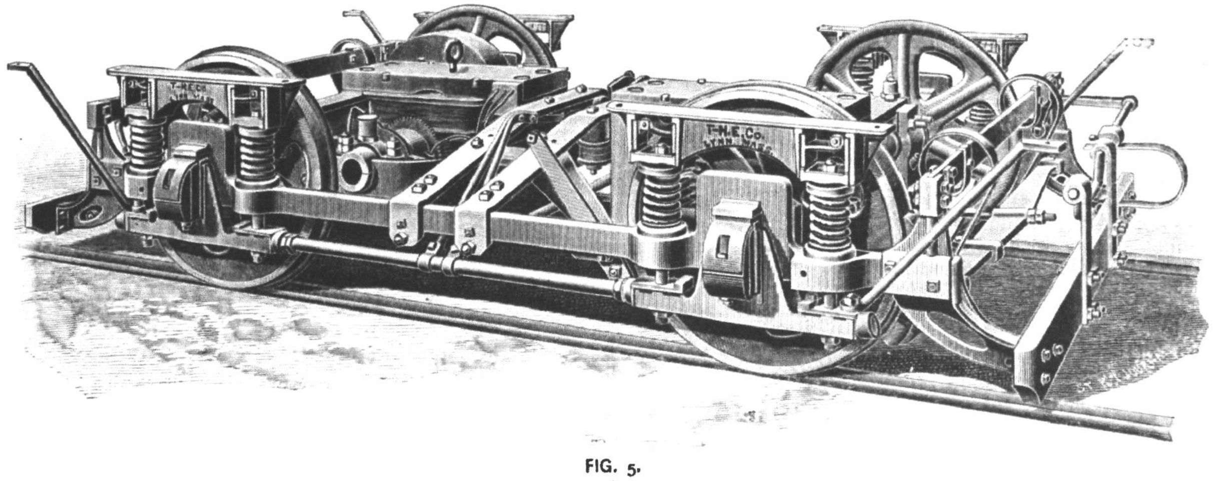

T-H.E.Co.
T-H.E.Co.
ST. RY. JOURNAL

FIG. 5.

The only perceptible sound is the rolling of the car wheels on the rails. The grating of the gears and fretting of the commutator bars against the brushes so offensive with the old type of motor at high speed, is eliminated.

The new machine having practically an iron-clad magnetic field avoids the liability to short circuit, common to motors supported by a nose plate.

The advantages claimed by the designers may be summarized as follows:

1. Noiseless single reduction gears, protected from dust and run in oil, and noiseless commutator; 2. Electrical and mechanical simplicity attained by use of two-pole type of motor; 3. Slow speed and powerful torque obtained by proper proportions; 4. Protection for fields and armature from dust and water; 5. Accessibility to all parts; 6. A ring armature not likely to become damaged, and, if accidentally injured, permitting easy repairs; 7. Moderate

Digitized by Google

THE STREET RAILWAY JOURNAL

Vol. VII. *NEW YORK & CHICAGO, DECEMBER.* *No. 12.*

The New "W. P." Motor of the Thomson-Houston Electric Co.

Visitors to the recent Street Railway Convention at Pittsburgh will recall a motor in the Thomson-Houston exhibits of apparatus called "W. P." and described as designed for narrow gauge service. The machine is illustrated herewith, and its history will prove particularly interesting to the street railway fraternity.

During the last spring the Thomson-Houston company, at their works in Lynn, began the development of a motor especially designed for narrow gauge service.* As the machine grew there were incorporated into it many improvements suggested by experience with previous types and the demands of railway service. The lessons of the preceding winter were particularly kept in mind and applied. The electrical parts of the new motor were so carefully protected from mechanical injury, snow and water that the machine took its name from this feature and was called the "W. P." or "water proof." The single reduction motor (known generally as "S. R. G.") that has been largely sold during the current year is also practically water proof, a separate casing bring used to produce the condition.

When the "W. P." went into service on narrow gauge roads its many improvements and its excellent work created, to an extent, a demand for it on roads of standard gauge. In response to this call a few machines were sent out and their record has been so satisfactory that the company have concluded to adopt and recommend the "W. P." as one of their regular single reduction motors for general railway service.

Among the railway companies that have tested the "W. P." motor is the West End company of Boston, and it is a striking evidence of the confidence which this motor has created that the Thomson-Houston company have received an order for 500 of these machines in further equipment of the West End system. The machine ordered by the West End company is very conservatively rated at twenty-five H. P., the other standard size at fifteen H. P.

The motor frame, Fig. 1, consists of two castings of steel clamped together by bolts at the front and back, the axle brasses being held between the two parts. The armature bearings are cast in one piece with the lower half of the frame, and are provided with caps so that the linings may be inspected or renewed without disturbing other parts of the machine. The lower half is shaped somewhat like a bowl, rounding up from a plow-shaped bottom, which will throw aside stones or other obstructions which may be on the track. The engraving shows the upper half of the case raised.

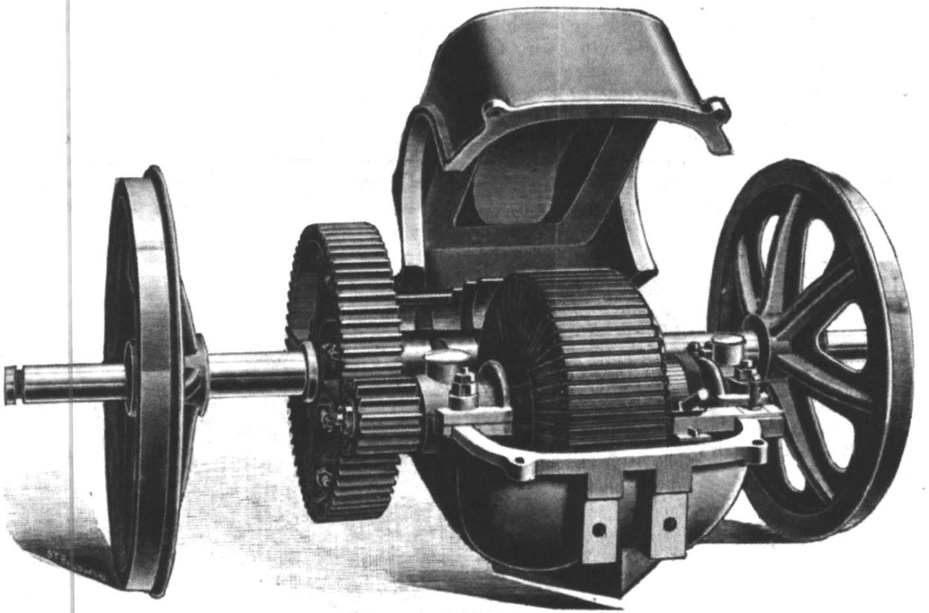


FIG. I.—THOMSON-HOUSTON WATERPROOF MOTOR—SHOWING CASE OPEN.

The upper half meets the lower, except upon the armature bearings, where holes are left for access to bearings and commutator and for ventilation. Only one field spool is used, which surrounds the armature and upper pole piece, and is itself completely covered by the frame.

A remarkable feature of this machine is the fact that it is so proportioned that at its normal load the solenoidal pull of the field is sufficient to lift the armature and relieve the bearing of its weight. There will, therefore, under ordinary conditions, be no tendency to hot bearings.

The motor can be run in water up to the axle—in fact, can be left standing in it without damage; and water dripping on it from above is shed off without gaining the interior of the motor. It will thus be seen that the armature, field spool, commutator and brushes are completely inclosed in the frame.

The parts of the frame are hinged together at the axle end. By removing four bolts, therefore, the upper half may be swung upward, or the lower half downward through a trap in the car floor or into a pit under the track, as may be convenient. The armature or field spool may then be easily removed.

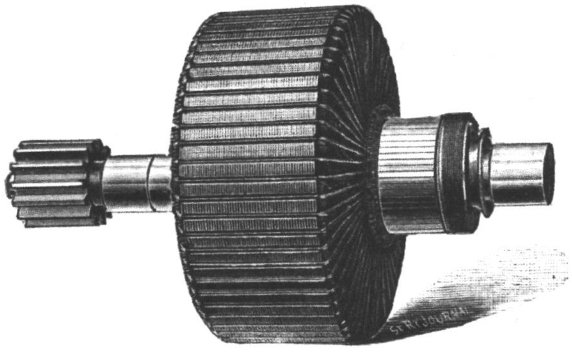


FIG. 2.—THOMSON-HOUSTON "W. P." MOTOR—ARMATURE.

Not only is the motor, as a whole, ironclad, but the armature is also ironclad. The core is a ring with projecting teeth of a peculiar form. The coils are wound between the teeth and held firmly in place by wooden wedges. No binding wire is used, and to replace a coil it is only necessary to drive out a wedge and the coil can be rewound without disturbing the rest of the winding. The importance of this feature will be appreciated by those who have had to repair drum armatures. The winding is continuous; joints in the wire, where necessary, are electrically welded, no solder whatever being used. This construction protects the armature winding from mechanical injury as it is below the surface of the iron core. Electrically, a decided advantage is gained because the air gap can be made very small. This permits of comparatively few turns of wire being used to excite the field and consequently requires but a short magnetic circuit. It will be noticed also that practically all the metal in the machine is used in the magnetic circuit, thus making the weight of both iron and copper small, while the efficiency of the motor is very high.

The brush holders are mounted in a groove planed in the frame alongside of the armature bearing. By giving a quarter turn to a handle on the brush holder, it may be taken from the motor to examine or renew a brush. The convenience of such an arrangement is obvious, as it obviates the necessity of reaching down into the motor and handling a brush which possibly is hot.

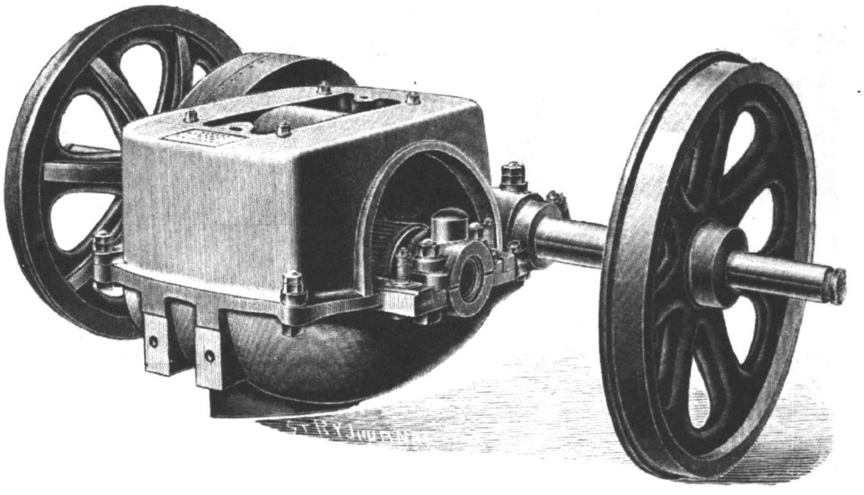


FIG. 3.—THOMSON-HOUSTON "W P." MOTOR—SHOWING CASE CLOSED.

The armature shaft has been made short and heavy to avoid the possibility of springing and is fitted with steel shells, thus ensuring a proper bearing at all times. In case of wear from long use or scoring from grit these shells can be replaced. The linings of the boxes are of punched sheet metal just thick enough to stand the wear required of them, and when thrown away waste little metal. The gears are of steel and are run in a case filled with oil. This case is split in halves and has a hinged cover through which the gears may be inspected and oil introduced. By loosening the nuts on two hinged bolts a section of this case can be removed and the pinion on the armature shaft drawn off without taking apart the gear case proper. The small size of this motor permits two of them to be mounted on a truck of five feet wheel base and three feet gauge.

These motors have not only been thoroughly tested at the works of the company, but have been in regular service on several roads. They have proved themselves to be highly efficient and able to stand the roughest usage without injury.

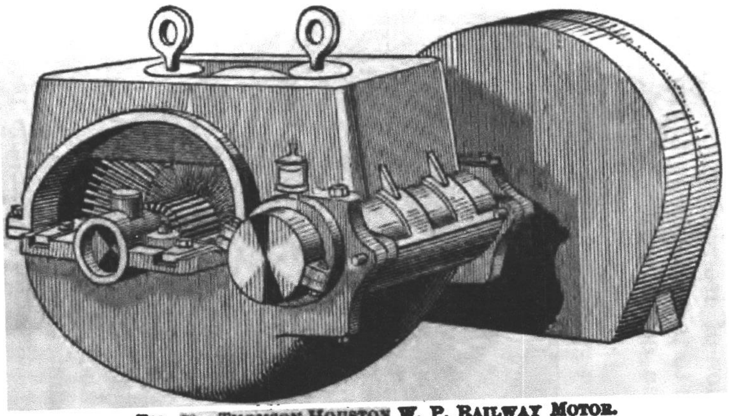


FIG. 53.—THOMSON-HOUSTON W. P. RAILWAY MOTOR.

~~[illegible] make as well as on most of these of European makers. We noticed that their old fashioned running gear, which preceded the superspring gear, is also being used to a great extent.~~

~~A great many of the cars of foreign manufacture are attempted copies of the Stephenson standards, and like all imitations do not show to very good advantage. It is a proverb of universal acceptation that "imitation is the sincerest flattery," and in this case the proverb is exemplified most clearly.~~

~~The foreign car manufacturers go so far as to imitate the Stephenson match scratcher, of the familiar S design, and the door handle with the initials J. S. The walls and ends of the cars, on account of being badly joined in the car of foreign make move independent of each other, and as to lightness, they do not, of course, approach the cars built in the famous New York shops.~~

G.

Digitized by Google

The Thomson-Houston Rheostat (see Fig. 60) has the resistance laid closely in a semi-circular iron trough. This trough is connected by radial spokes with a center or hub that supports a vertical insulated steel spindle. On this spindle turns a wheel or drum, actuated by the driver through means of a sprocket chain and steel cable. The drum moves a brass arm, on the outer end of which is a shoe that rubs on top the resistances in the trough.

The resistances are made in the form of thin iron punchings, of a shape shown in Fig. 61. Although the piece is only about 2½″×4″ the path through it for the current is long. The current enters one end, at "A," and is obliged to travel a crooked path to arrive at "E." Another punching exactly the same touches the parts "E," of each, together, being separated from the rest of the surface by a thin sheet of mica. In this second punching the current travels from "E" to "A"; thence it passes by contact into the part like "A" of the third punching. A sheet of mica keeps the punchings from touching

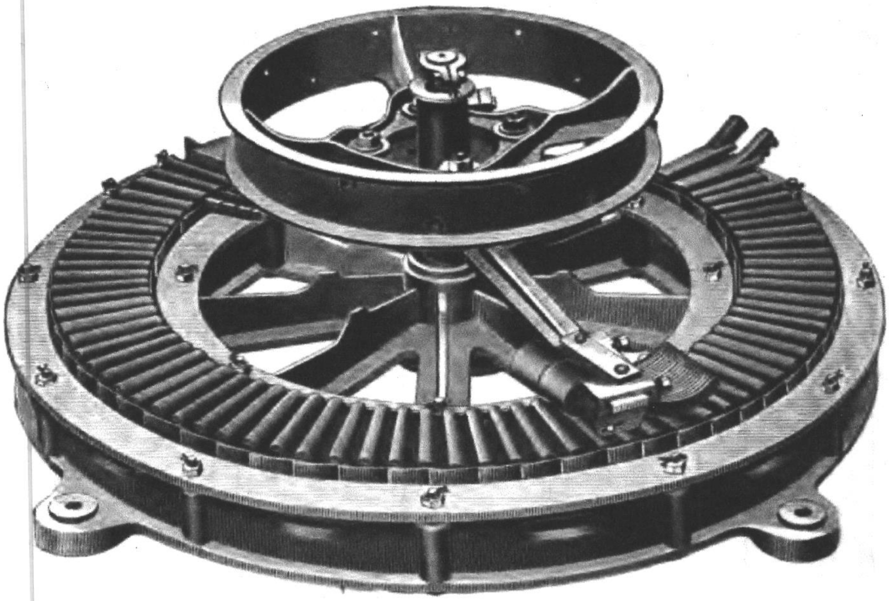


FIGURE 60.

except at the extreme ends. So on, in the series, the current goes up and down, back and forth through the sheet iron until the requisite amount of resistance has been reached. At regular intervals, thin cast-iron plates, with thickened upper edges, are inserted. These stand about half an inch above the punchings, and are the parts that receive the contact with the shoe on the movable arm. These contact plates are thicker at the outside edge than at the inside, and thus compensate for the difference in length of the inner and outer semi-circumference of the trough.

The bottom and sides of the trough are lined with mica and slate; the plates are held down in place by two semi-circular iron bands pressing (with mica insulation) on the shoulders at "A" and "E." So it is seen that the entire construction is iron, mica and slate—articles either cheap or incombustible. These rheostats can be kept heated red hot for hours without appreciable damage. The resistance is about 20 ohms and the capacity 60 amperes.

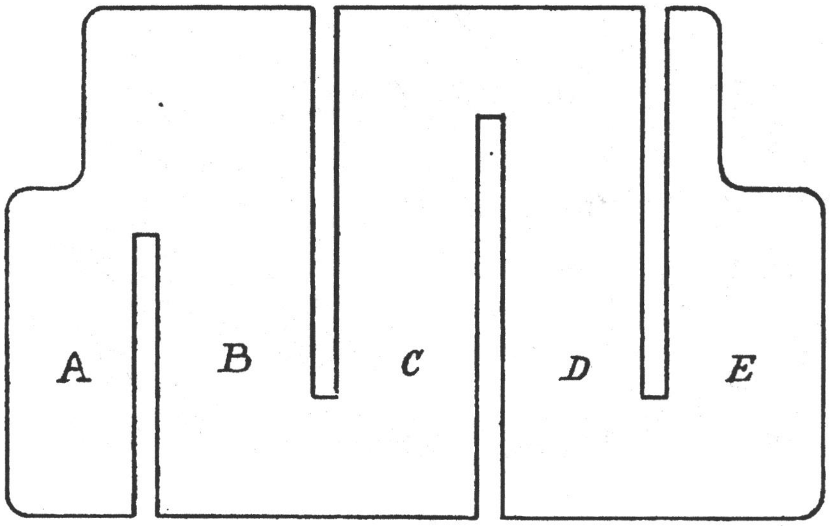


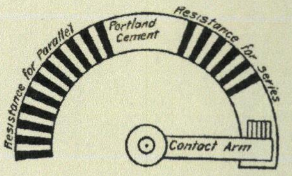
FIGURE 61.

Stops for limiting the extent to which the arm can be moved are provided, and at the place where the contact is made and broken a magnetic "blow-out" is located, which quickly extinguishes the arc that follows the breaking of the circuit.

Street Railway Review 8-15-1897

SERIES-PARALLEL CONTROL AT MINNEAPOLIS.

For some years the Twin City Rapid Transit Company of Minneapolis and St. Paul has led a very independent existence as regards electrical and mechanical repairs and renewals. Instead of buying new motors to replace early types as the majority of roads have done which found themselves with old equipment on their hands this road has rebuilt in its own shops nearly all the older motors purchased by it. As a result it now has a motor equipment which is fairly economical as to repairs. Following out the same policy the method of car control was some time ago changed from rheostatic to series-parallel by building series-parallel controllers in the company's shops from material taken from the old rheostat controllers. The principle of these controllers is very simple. There is no contact drum for changing connections, the change from series to parallel being made by a switch which is operated by the controller handle when the handle is at the point where the connections are to be changed from series to parallel. A rheostat of the old T.-H. type is used for resistance. The first thing done by the controller handle when the current is turned on is to establish a circuit through a few segments of the rheostat and the motors in series As the handle is advanced the contact arm of the rheostat cuts out the resistance until finally after all the resistance has been cut out the circuit is opened at the contact arm and the handle operates the switch which changes the motor connections from series to parallel. The contact arm then moves on to another set of rheostat segments thereby establishing a circuit with the motors in multiple. As the contract arm advances the rheostat is cut out and the motors are brought up to full speed. The arrangement of the rheostat is roughly shown by the accompanying sketch. Where the circuit is broken between the series and parallel combinations the contact arm passes over a filling of Portland cement which has been found to be the best material to withstand the arcing and one which is easy to renew when worn out. The whole mechanism is contained in a large wooden box on the platform, and while rather cumbersome is a good home made improvement on rheostat control.



DRAWINGS

Diagram of Resistance for Dummy Car, Selby Hill 10-19-1904
Two W.P. 50 motors in parallel

#2-6142 Series-Multiple Rheostat 5-31-1892

Platform Rheostat
#2-6143 5-4-1893
#2-6144 5-?-1891? or 1893?
#2-6145 5-9-1893
Appears to be three slightly different versions. All three have the reverse handle and lever included in the assembly (on the left side toward the front).

#2-6148 Series-Multiple Rheostat and Outside Resistances for W.P. Motor Equipments 9-1895

Screen Guards

TCRT soon learned that the riding public was not accustomed to boarding and alighting from the faster electric cars. The number of accident claims for this type had risen substantially. Wire-mesh guards were installed on both sides of the front platform and on the left side of the rear platform of closed cars. These guards were called gates, but they were movable only to the extent that their locations could be quickly re-arranged (removed and replaced) on cars equipped for double-end operation. Thus the only entrance and exit was from the right side of the rear platform under constant observation of the conductor.

Beginning in August 1894 wire screens were placed over the windows on the left side of closed cars. The purpose was to avoid injuries to passengers from both the overhead poles (located between the tracks) and passing streetcars.

Vestibules

In January 1893 the Minnesota Legislature was considering a "vestibule bill" requiring all streetcars in the state to have enclosed front and rear platforms from December through March each year. TCRT opposed the bill but it passed the legislature. An appeal to the state Supreme Court was undertaken but the court upheld the law in July 1894. During 1894 TCRT shops were busily engaged in constructing front vestibules on many of its cars. Apparently the law as passed did not require vestibules on the rear platforms. The 1893 financial panic had resulted in loss of patronage so that service was cut substantially. Consequently many cars were placed in storage and these were not fitted with front vestibules.

TCRT cars were normally operated as single-end cars; however certain operations required double-end cars and these were the only cars which received vestibules on both platforms.

> "Lake Harriet, Kenwood, and Bryn Mawr lines end at 3rd St. and Hennepin Ave. and do not turn so use double-end cars vestibuled both ends."

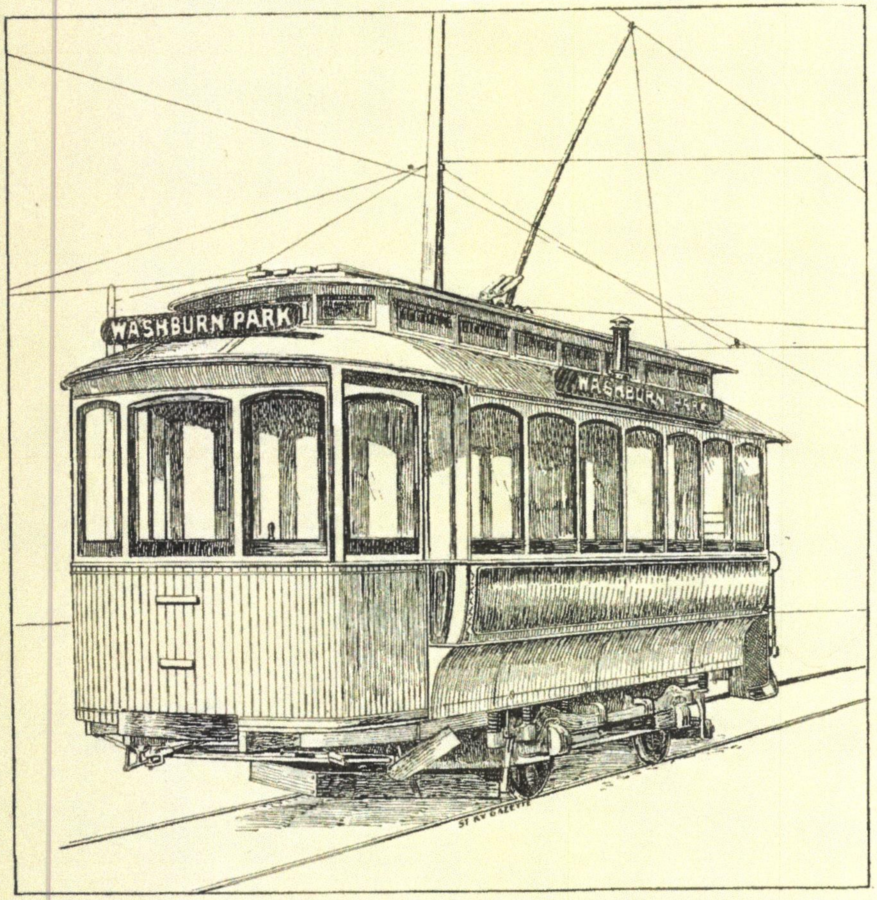
SRJ July 1890

The company has adopted open cars with barred sides which compel passengers to enter and leave at either end. This is a precautionary measure against the danger of striking the center poles.

MINNEAPOLIS VESTIBULED CARS.

The Twin City Rapid Transit Company of Minneapolis has been complying in good faith with the state law which provides that electric cars must be provided with vestibules. Certainly no fault can be found with the type of vestibule which is shown attached to the car in the accompanying illustration. It affords ample protection to the motorman, and it does not detract from the good appearance of the car. As far as can be learned the company has solved the vestibule problem. If the vestibule proves satisfactory in service and the protection for the men does not lead to an increase in the list of accidents, the question may be considered disposed of as far as Minneapolis and St. Paul are concerned.

While the company determined months ago to comply with the law, and while Mr. Lowry had favored the adoption of the measure which made the use of the vestibule compulsory, the equipment of cars did not proceed with as much rapidity as the local authorities wished, and proceedings were instituted against superintendents in both St. Paul and Minneapolis. The cities were successful and fines were imposed for the non-equipment of cars. At the present time there seems to be general satisfaction with the progress which the company is making in vestibuling its cars.



THE MINNEAPOLIS VESTIBULE.

The illustration shows very clearly the style of the vestibule adopted. The equipment was built in the company's shops. When the cars were run into the car house they were stripped of everything with the exception of the hood on the end to which the vestibule was to be attached. New platforms were built with heavier supporting arms in order to carry the increased weight. The iron dashers and old style of crank brakes were discarded and for the latter wheel brakes were substituted. The buffers, platform arms, headers, sub-sills and belts are of white oak. The posts and water table are of Southern ash and the flooring is of Southern pine. The vestibules are provided with double windows throughout and the glass is "A A" double strength. Trap doors are arranged in the flooring to give access to the track switches.

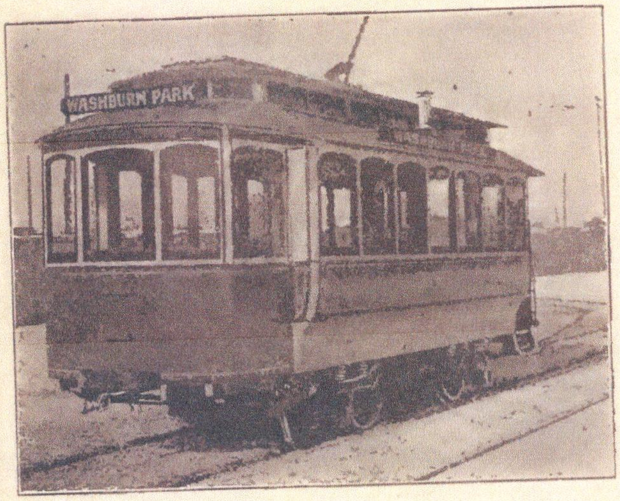
Street Railway Review 7-15-1894

MINNESOTA VESTIBULE LAW VALID.

The vestibule laws passed by the granger legislatures of a few states have not generally met with very tender mercy at the hands of the courts. That it is a piece of "class legislation" seems to be the general opinion.

The Supreme Court of the State of Minnesota, however, has declared constitutional the law compelling the use of the "vestibule" for the protection of motormen during the winter months. The test case was that of Superintendent Hoskins, of St. Paul, who was arrested for failing to comply with the requirements of this ordinance.

The Twin City Rapid Transit Company carried the case to the Supreme Court with the result indicated.



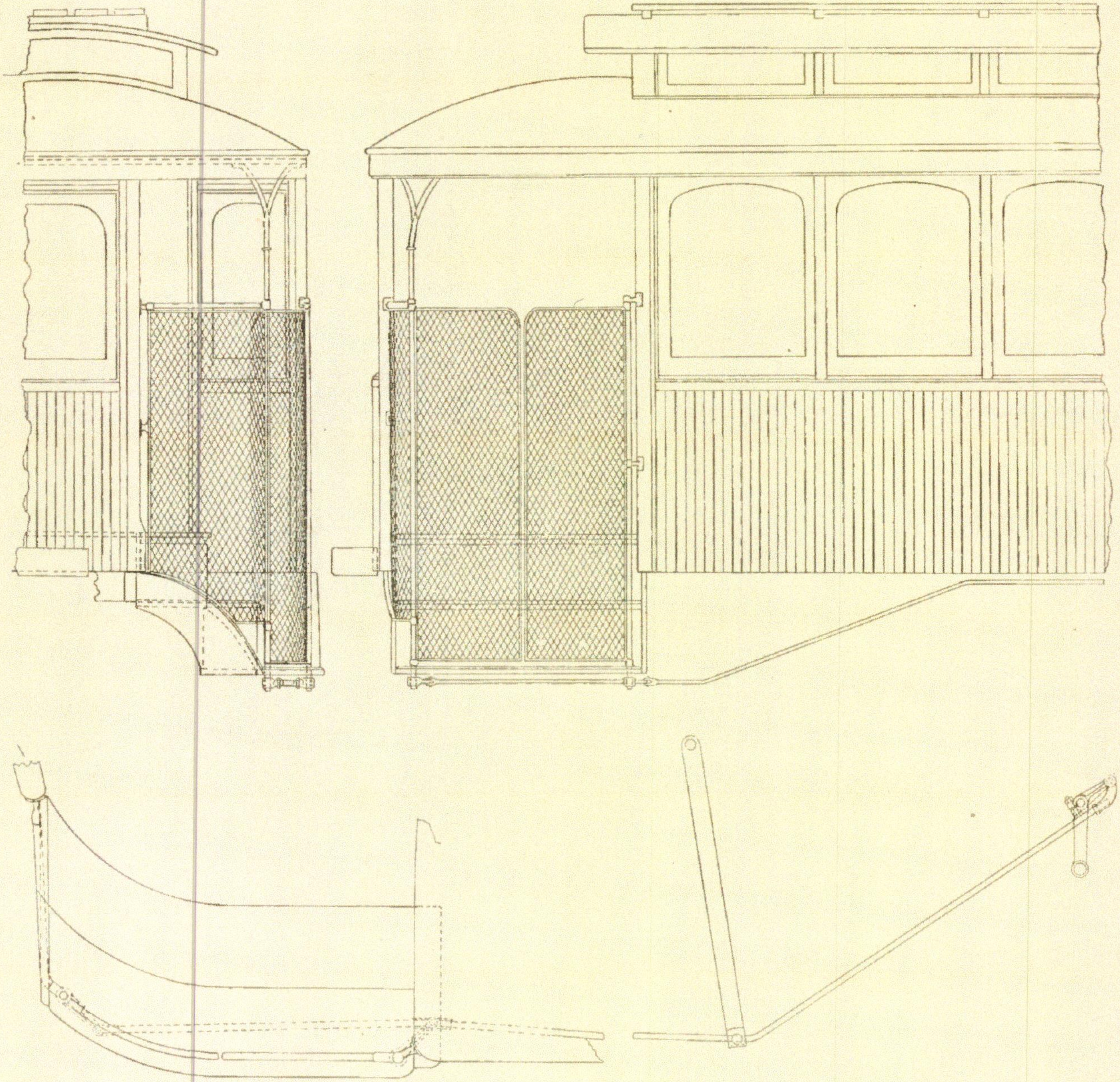
The law was sustained at all points. The court holds that when running at a speed of eight or ten miles an hour, with the mercury below zero, the motorman's position is not only one of discomfort, but of actual danger to health and sometimes to life, not only to himself, but indirectly to the passengers in his charge. The corporation held in its plea that the measure was class legislation and not an exercise of the police powers of the state.

One of the vestibules which was built last winter by the Twin City Company, is represented in the accompanying engraving.

3-15-1895

SAFETY GATES AT MINNEAPOLIS.

Determined to put a stop to the large per cent of petty accidents due to people getting on and off cars while in motion, W. J. Hield, general manager of the Twin City Rapid Transit Company, of Minneapolis and St. Paul, has been equipping the cars of those lines with a new system of safety gates as rapidly as possible. These gates are opened and closed by the motormen on signal from the conductors. They cannot be opened except from the front platform. Before designing these gates, the following conditions were laid down, to be complied with. They must be operated without any loss of time, the cars to run on the same schedule as without gates. They must effectually prevent any person from leaving or getting on the car until allowed to do so by the motorman. They must not occupy, when closed, any space on the platform which might otherwise be occupied by passengers, and when opened, must not hinder the loading or unloading of cars. The gates must be operated by the motorman on signals from the conductor, without danger to passengers who are about to leave or enter the car. To fulfill these conditions, a double swing gate, opening outward, is employed, and the posts are placed as near the outer edge of the steps as possible. The posts are carried by the steps and by brackets fastened to the body of the car. The dimensions of the gates for the 40-foot vestibuled cars are 21 inches by 5 feet, 4 inches. For smaller cars used by the company, the dimensions are 15½ by 4 feet, 2 inches. They are con-



SAFETY GATES AT MINNEAPOLIS CONTROLLED BY MOTORMAN.

Street Railway Review

structed with channel iron frames, (⅞-inch for the large, and ¾-inch for the small), bound with oval strap, and filled with wire lattice of No. 6 wire, with 2-inch mesh. The gates are bolted to posts of ¾-inch extra heavy pipe. On the lower end of the pipe below the step, is fastened a lever arm. The arms of the two gates are connected by a link, and a connecting rod of ½-inch pipe runs to the front of the car. The arms are so set that when a tension is placed on the connecting rod, the gates close and the lever stands on an angle of 45 degrees to the line of strain. At the front of the car, and in a position to be easily operated by the motorman, is a handle lever on a vertical shaft. At the lower end of the shaft is a third lever, to which the connecting rod is coupled. The locking of the gates is accomplished both in the open and closed positions, by making the relative dimensions of the levers such that the controlling staff lever in its extreme position, travels slightly past its dead center, thus preventing the combination from being opened from the rear end of the car. The 40-foot vestibuled cars on the interurban route, between Minneapolis and St. Paul, have all been equipped, and the plan will be extended to all the cars in both the cities. Accidents caused by boarding and leaving cars in motion, cause the company more annoyance and expense than any others, and it seems as if the system here described would prove an absolute check on them. The only objection to the plan comes from the men who are in the habit of getting on and off cars in the middle of the block. It may mean a slightly slower schedule on the crowded lines, as it necessitates a dead stop for every passenger or group of passengers that get on or off, whereas, it is customary in many cities for passengers to get on and off before the car has stopped, so that it can proceed without coming to a full stop. While this has the advantage of making a faster schedule, it in a measure invites accidents, and it is a question, after all, whether with our present fast moving electric cars, it is not advisable to follow the Minneapolis plan, and absolutely shut off accidents from the source mentioned. Summer cars on this system will be equipped in the same way. Footboards are to be taken off and screens put along the sides, so that the only exit is the rear platform.

Wheels in Minneapolis.

Minneapolis, Minn., March 8, 1895.

Editors Street Railway Journal:

Your letter with reference to steel tired wheels has been referred to me. We have used since November, 1892, a large number of Allen steel wheels, thirty-three inches in diameter, under our large interurban cars running between St. Paul and Minneapolis. On certain portions of this road we run at a high rate of speed, and the steel wheel is used as an element of safety. But operating these cars, which are forty-three feet in length, at a high rate of speed, we had a great deal of trouble with our motors, which, I am pleased to say, is now entirely removed. For this reason, we are constantly changing trucks, and it was impossible for us to keep a mileage, but taking a total estimate of our mileage, and making as close figures as we can at this time, they have averaged about 50,000 miles.

We are at the present time keeping an accurate mileage, and at some future time can give you definite information. Yours truly,

C. G. Goodrich, Vice-President
Twin City Rapid Transit Co.

(No Model.)

W. J. HIELD.

STREET CAR GATE.

No. 546,116. Patented Sept. 10, 1895.

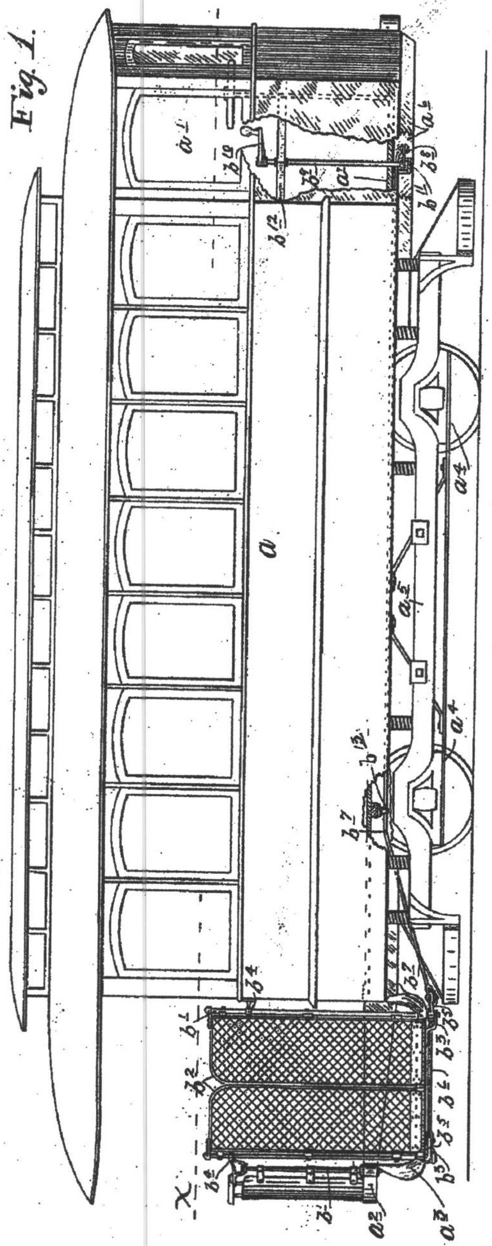

x
a
a1
a2
a3
a4
b
b1
b2
b3
b4
b5
b10
b12
x

Fig. 1.

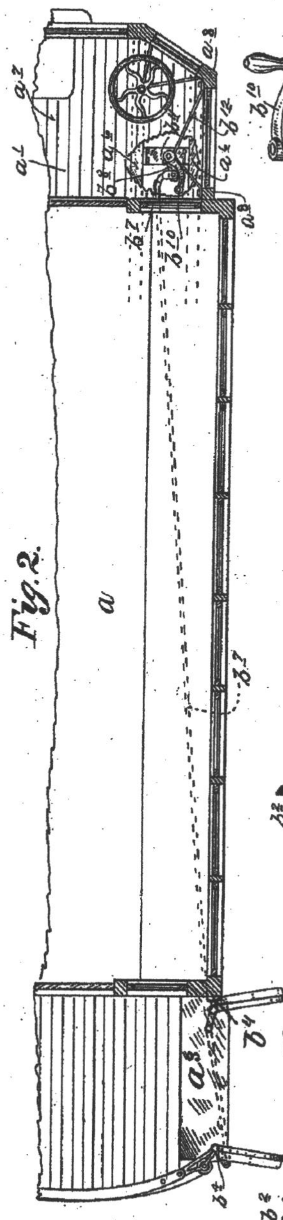

a
a1
a2
a3
a5
a8
b4
b7
b10
b12

Fig. 2.

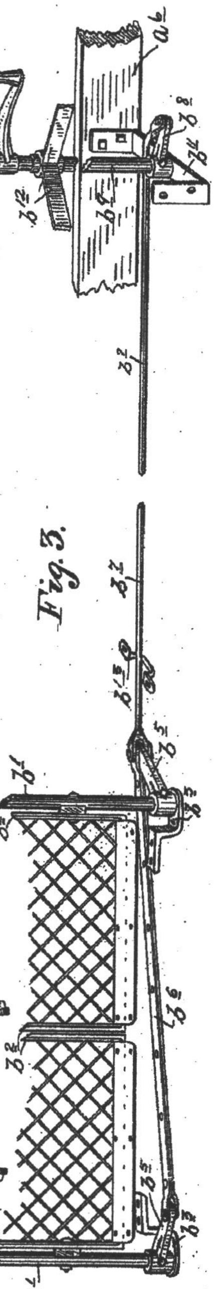

a6
b1
b2
b3
b4
b5
b6
b8
b10
b12

Fig. 3.

Witnesses:

C. F. Kilgore

Frank D. Merchant

Inventor:

Willard J. Hield

By his Attorney.

Jas. F. Williamson

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

AVERY® C
PV119ED

UNITED STATES PATENT OFFICE.

WILLARD J. HIELD, OF MINNEAPOLIS, MINNESOTA.

STREET-CAR GATE.

SPECIFICATION forming part of Letters Patent No. 546,116, dated September 10, 1895.

Application filed December 31, 1894. Serial No. 533,442. (No model.)

To all whom it may concern:

Be it known that I, WILLARD J. HIELD, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Street-Car Gates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is especially designed for electric street-railway cars, although capable of use on other kinds of cars, and has for its object to provide a convenient and reliable gate for controlling the entrance to or exit from the car.

To this end my invention consists in the novel devices and novel combinations of devices hereinafter fully described, and defined in the claims.

The accompanying drawings illustrate my invention, wherein like letters refer to like parts.

Figure 1 represents in side elevation an electric street-railway car equipped with my improvement, some ports being broken away for better showing the construction. Fig. 2 is a horizontal section approximately on the line X X of Fig. 1, with some parts broken away; and Fig. 3 is a skeleton view, in perspective, showing the gates and the lever connections for controlling the same for the most part detached from their supports.

a a' a^2 a^3 represent, respectively, the body portion, the front-end vestibule, the rear-end platform, and the platform-steps of an ordinary street-railway car, such as are used in the electric systems in the Northwest. This body is mounted on suitable trucks a^4 and truck-frame a^5 of the ordinary standard construction, and may either be equipped with an electric motor (not shown) for use as a motor-car or be a trailer, designed for connection to the motor-car. In all such cars, especially when equipped as motor-cars, the motorneer is provided with a front-end vestibule a', partitioned off from the body of the car, and wherein the motorneer constantly remains when the car is in service, and therefrom controls the movements of the car. Such cars are usually arranged to receive passengers from the rear end only, and on the double-track systems employed in all large cities are usually arranged to permit entrance and exit only from one side of the rear platform a^2, or, ortherwise stated, only a single set of steps a^3 are provided at the rear-end platform a^2, which are located on what is known as the "outside" of the car. Great difficulty has been experienced in controlling the entrance and exit of the passengers to and from the car. In spite of all precautions and care on the part of the conductor, passengers will persist in jumping on and off while the car is in motion. In consequence thereof accidents frequently occur with resulting large damage suits, in many instances, against the street-railway company or other proprietors of the street-railway. To meet these conditions and overcome these objections I provide a double or two wing gate b b, the wings of which are preferably made of open or net-like wire work, fixed to upright posts b' and marginal strips b^2. The posts b' are journaled below in bearing-brackets b^3, fixed to the lowermost of the steps a^3, and are journaled above in bearing-brackets b^4, one of which is fixed to the car-body and the other to the hand rail or guard of the platform.

The posts b' are provided near their lower ends with crank-arms b^5 fixed thereto, but located thereon so as to project in opposite directions. The said crank-arms b^5 are pivotally connected to the opposite ends of a common draw-bar b^6, which in turn is connected at its forward end to a draw-rod b^7, which extends forward under the car-body, as shown in dotted lines in Fig. 2, and is pivotally attached at its forward end to a crank-arm b^8 fixed to the lower end of a hand-shaft b^9 b^{10}. The lower end of the shaft b^9 has its bearing in a bracket b^{11}, which is bolted to two sills a^6 of the motorneer's platform a^7 in the vestibule a'. The upper end of the shaft b^9 has its bearing in a hub of a two-arm bracket b^{12}, the arms of which are bolted to the side posts a^8 or other fixed parts of the vestibule a'. The forward end of the draw-rod b^7 is curved, as best shown in Figs. 2 and 3, so as to permit the parts to assume the position shown in the several views. The draw-rod b^7 may work through one or more suitable keepers b^{13} fixed to the car-body. The crank-arms b^5 on the gate-wing posts b' are of greater length than the crank-arm b^8 on the hand-shaft b^9. Hence the hand-shaft b^9 and the crank-arm b^8 will have to move through a greater number of degrees than the crank-arms b^5 and the posts b' in throwing the gate-wings from their closed to their open position, or vice versa. The parts are proportioned to throw the gate-wings through a little more than a quarter of a circle, and the relative proportions of the crank-arms b^5 and the crank-arm b^8 are such that to accomplish this result the hand-shaft b^9 and the crank-arm b^8 will move through a little more than a half-circle. Otherwise stated, the crank-arm b^8 throws past the center in each direction, and is thereby made to lock the gates either in their closed or in their open position. In Fig. 1 all the parts are shown as they would appear when the gate-wings are closed, and the same is true of the parts shown in Fig. 3. In Fig. 2 all the parts are shown as they would appear when the gate-wings are open.

From the foregoing statements it must be obvious that the gate is entirely and solely under the control of the motorneer in his vestibule a', and that the gates cannot be opened until the motorneer sees fit to operate his gate-lever b^{10}. The entrance and exit of the passengers to the car is therefore solely and entirely under the control of the motorneer only. Hence, entrance and exit need only to be possible when the car is at rest. The advantages of such an arrangement have already been pointed out.

It will, of course, be understood that while I have shown and described the gate as composed of a pair of wings that this gate might take various forms. For example, the gate might be composed of a single wing, or it might be in the form of a sliding bar or folding gate. In other words, any form of a gate which is provided with operating connections which extend to the motorneer's platform would be within the scope of my invention.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with a car body, of a gate controlling the entrance thereto, and lever connections for operating said gate, arranged automatically and positively to lock the same in one of its extreme positions, under the action of moving the gate, substantially as described.

2. The combination with a car body, having a rear end passenger entrance and a front end platform for the motorneer, or car operator, of a two-winged gate controlling said rear end entrance, and lever connections for operating said gate, extending to the motorneer's platform, said operating connections being arranged automatically and positively to lock the wings of said gate both in their open and closed positions, under the action of moving the same, substantially as described.

3. The combination with the car-body, of a gate controlling the entrance thereto, a draw-bar having connections to said gate, at one end, and a hand operated crank-shaft at the other end of the said draw-bar, having a crank-arm connection thereto, which crank-arm is arranged to be thrown, in the act of moving the gate, to and from a dead center, whereby said gate when moved to its closed position will be automatically locked, substantially as described.

4. The combination with a car body, having a rear end platform, for the entrance or exit of passengers, and a front end platform for the car operator, of a two-wing gate closing the entrance to said rear platform, a draw-bar connected to crank arms on the pivot-posts of said gate-wings, a draw-bar extending forward from said connecting bar to a hand shaft on the operator's platform, and a crank arm on said shaft connected to said draw-bar, which crank arm is of less length than the crank arms on said gate-wing posts, whereby the hand-shaft crank will be thrown by the dead center either to open or to close the gate-wings, and will thereby lock the gate-wings in their open or closed positions, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLARD J. HIELD.

Witnesses:
WM. R. MORRIS,
FRANK P. MERCHANT.

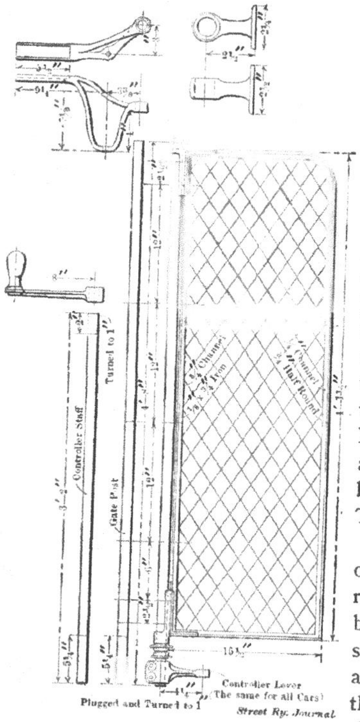
SRJ 6-13-1903 VOL XXI NO. 24

SAFETY GATE FOR TROLLEY CARS

The Twin City Rapid Transit Company is equipping its cars with a new style of gate that has many advantages, according to the management. Fig. 1 shows this gate in a 40-ft. vestibule car. It is controlled through a crank handle located in the motorman's vestibule, adjacent to the brake handle, by a system of levers and cranks connected rigidly with the swing-post of the gate and connected in the position shown in the cut; these gates close on the lower step of the car and cannot be opened by passengers. They are practically locked in this position, and are secured from interference, as they can only be opened by the motorman, who is instructed to keep them closed while the car is in motion. The construction of the gate, as applied to single-truck closed cars, is shown in Fig. 2.

The officers of the company report that accident cases growing out of injuries to passengers while attempting to leave or enter cars in motion are very rare occurrences on the systems covering St. Paul and Minneapolis and several interurban lines controlled by the Twin City Company.

The instructions for operating these gates direct the motorman first to bring his car to a standstill, then open the gates, and only close them after the conductor has given the signal to start. As the gates swing open, as shown, they do not interfere with the ingress or egress of passengers, but prevent crowding against the body of the car. When a gate stands open at right angles passengers are obliged to enter in an orderly manner, and this gives the conductor more control over crowds of passengers.



Street Ry. Journal

DETAILS OF GATE FOR SINGLE-TRUCK CLOSED CARS

◆

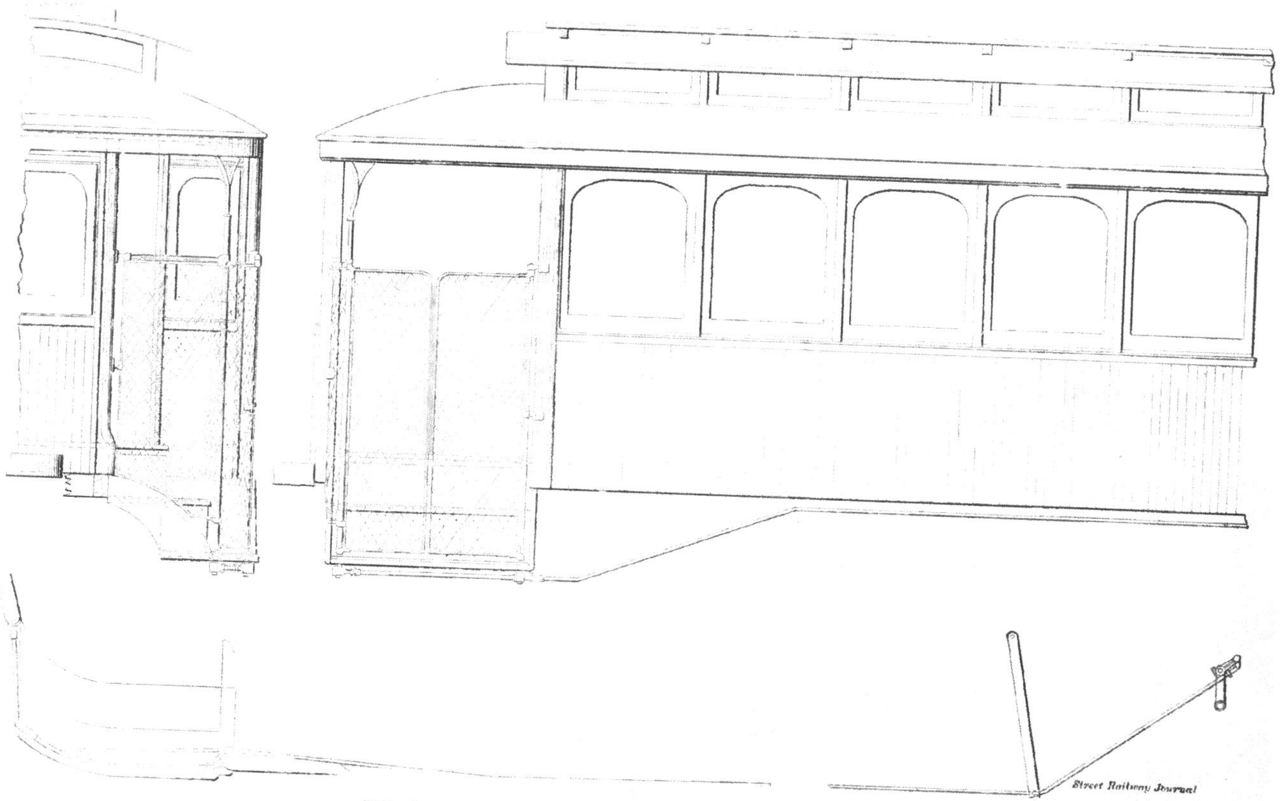

Street Railway Journal

FIG. 1.—SAFETY GATE FOR 40-FT. VESTIBULE CAR

Folding Wire-Mesh Gates

Closed Motor Cars:
Simultaneously with the installation of vestibules a single pair of folding wire-mesh gates under the control of the motorman was installed on the rear steps of all closed motor cars. The first car was equipped with gates November 20, 1894, and the last car completed April 15, 1895. This included #607-#626 which received such folding gates on [redacted] the [redacted] rear steps [redacted] only. * [redacted] From these installations was derived unique terminology that survived until the end of streetcar operation. The "pole side" of a car was the left-hand side adjacent to the overhead poles which were then located in the center of the street between the double track, while the "gate side" of a car was the right-hand side on which the folding gates were installed. It should be noted that the original wire-mesh screen guards were retained on the "pole side" of the rear platform of closed cars. Double-end vestibuled cars had the folding wire-mesh gates at the steps on diagonally opposite ends; a hinged door behind the gates could be used to close off the gates and steps so as to fully enclose the platform being used by the motorman.

* Front exit steps were removed.

Open Motor Cars:
Beginning in June 1896 all open motor cars were modified. The footboards were removed, a folding step with a single pair of folding wire-mesh gates were installed on the rear "gate side" platform, and both sides enclosed with wire-mesh screen guards. A telescoping metal gate (no steps) was installed on the both sides of the front platform and the "pole side" of the rear platform. Photographs indicate the open motor cars were received from the builders with a center aisle so these modifications were readily accomplished. The long (double-truck) open motor cars were strengthened and truss rods added. It was reported that during the summer of 1896 a number of open motor cars were lengthened by cutting them in two and splicing in new construction but no further details were provided.

Closed Trailers:
These never received any folding gates. They continued in service with the wire-mesh screen guards as previously described.

Open Trailers:
These also had the footboards removed, a fixed step installed on the "gate side" rear platform, and both sides enclosed with wire-mesh screen guards. Some cars came from the builder with a center aisle; those cars that had full-width benches had the benches re-arranged for longitudinal seating. Some open trailers were used in double-end operation; these had the fixed step installed on diagonally opposite platform ends; the end not in use was fitted with the portable wire-mesh screen guard as previously described.

Trailer Operation

Photographs show that the rear dash of single-end motor cars and both dashes on cable grip cars, the front dash of trailers, were two-part; that is, a passageway was provided in the center. Trailers used in double-end operation (electric and cable) had both front and rear dashes two-part. This was part of the original car design to allow the conductor on the motor car to readily pass through to the trailer to collect fares when trailers were used for only two or three trips. If the trailers were used all day, each trailer had its own conductor.

Destination Signs

The later horsecars as well as the early electric cars used removable destination sign boards mounted in brackets on the car roof. At night colored lamps under the roof were used; thye were called a failure. In 1892 a small brass box containing a light and colored glass slides was installed on each car. In 1894 new illuminated signs were being tested but details were not provided. In 1896 a new system was begun: wood, five-faced, revolving, multi-colored sign boards were mounted on each side of the car roof, with a glass sign in the deck roof front window, white letters on a black background.

Exterior Paint Schemes

In early horsecar days each car was painted a specific color depending upon which line it was used. During the 1880's each company developed a standard color for all cars. In September 1891 it was reported that MSR cars were canary yellow with white trim, while on SPCR the prevailing color was a rich green. In 1896 TCRT adopted a system wide color of lemon yellow with trim colors of green, bronze and silver. On open cars the panel color was lemon yellow and the sill color olive brown. A program was developed to repaint all cars at the 3rd Ave. N. Shops (Minneapolis) at a rate of 15 cars per week. Old photographs indicate that not all of the trailers were repainted.

Because of the duplicate numbers on many MSR and SPCR cars, the letter prefix "A" was added to SPCR cars, and apparently to MSR cars if used in St.Paul. If old records are reliable apparently not all such cars received the prefix. Subsequent to 1896 a revision was made in that the prefix on motor cars was changed to the numeral "1". Based on the 1904 records this seems to be what took place. MSR #303-#362 became #1303-#1362. MSR #363-#369 became #1363-#1369. SPCR #570-#634 became #1570-#1634. Various cars, but not all cars, in the MSR #503-#538 series and SPCR #503-#539 series became 1500's; there were no duplications between the series.

STREET RAILWAY JOURNAL
JUNE 1896
Pages 282 and following

Motors

During 1893 the entire motor equipment was remodeled or rebuilt. The company has 200 equipments of the Sprague double reduction gear motors, some S.R.G. and some W.P. motors.

Remodeling lay in rewinding both armatures and fields, and the substitution of large shafts with tapering fits for collars and commutators. In the W.P. 50 motors a second field coil which was placed in the lower part of the body or shell of the motor was added. A long hollow shaft was also substituted to bring the commutator outside of the case.

Controller

The case enclosing the rheostat (old style, semi-circular type) also contains the fuse boxes and cut-out switches. A modification has been made in the connections so that on the first few points the motors are connected in series. After that the multiple series connection is used as formerly.

Gears and Pinions

The company cuts its own gears and pinions. It may decide to stop cutting the pinions but will continue to cut gears. It has two milling machines for gear and pinion cutting.

Brass Foundry

The company makes its own brass and bronze castings and trimmings. It has a very good brass foundry. Trolley wheels, cast bonds, and trimmings of nearly every description are manufactured. The mixture for trolley wheels and some other castings is one part (sic) tin and nine ounces of zinc to seven pounds of copper.

Repair Shop

As a general thing the cars are taken into the shops every two weeks for inspection and such repairs on motors and trucks as may be necessary. The portion of the shop into which cars are run for motor and truck repair was formerly a roundhouse. Power for operating shop machinery is one 75 h.p. bipolar motor.

Cars

During 1893 the company spent $75,810 on repairs to carbodies. A large part of this was the expense of the reconstruction of our horsecars, increasing their length and adapting them to electrical use.

Cars on the Interurban line have Baker heaters. This line is 10 miles long, with 50 minutes running time and 5 minute headway. This line uses 50 lb. T rail with fish plates as on ordinary steam railways. There is no paving on this line. At the only steam crossing only a single track is used; a precautionary measure to prevent cars passing while crossing the steam tracks.

Interurban line cars are 44 ft. in length overall, double trucks with 33" wheels, the leading wheels in each truck being of the steel tire type. Cars weigh empty 30,500 lbs., and are estimated to weigh with 100 passengers 43,600 lbs.

The 18 ft. cars used on the other sections of the system weigh from 14,000 to 15,000 lbs.

Headlight

A new electric headlight has recently been designed in the company shops. It is about one foot in diameter with the ordinary reflector, but the socket for the incandescant bulb is at the apex of the cone so that the bulb is held in a horizontal position.

Gates

The gates are on the rear platforms of single-end cars and on the diagonal platforms of double-end cars. They are of two-leafed wire, open outward from the center, and have a framework of gas pipe with interlacing wire. Each gate is hinged above the lower step and is operated from the front platform by bell cranks and a crank lever. After two different unsuccessful designs this gate was installed on the first car 11-20-1994 and ran for some time as an experiment which was successful--the remaining cars in both cities were so equipped, the work being completed 4-15-1895. On the Interurban line cars a more elaborate gate is provided.

Open Cars

The long open cars are being strengthened by the addition of a truss rod 1" in diameter, anchored at each end and passed over pedestals nearly as high as the seats, adding largely to the strength of the car. At the same time the cross bolts have been enlarged and side sills reinforced by a steel plate.

Cross seats of the open cars have been widened by lengthening the back supports so that the seats are 2" wider than formerly.

The open cars are being fitted with gates, and are being enclosed on each side by wire screens so that passengers can only enter or leave by the rear platforms.

A number of open cars have been lengthened by cutting them in two and filling in the middle part with new contruction. Hoods have been lengthened and supported by pipe posts from the platform.

The sills, trucks and fenders of the open cars are Olive Brown with Lemon Yellow for the posts and upper parts.

Panel Color: Lemon Yellow
10 lbs. Lead in oil
1 lb. Lemon Chrome in oil
½ lb. Golden Ochre in oil
5/16 lb. Japan
Turpentine

Sill Color: Olive Brown
5 lbs. Golden Ochre
1/16 lb. Prussian Blue
1 lb. Indian Red
1 lb. White Lead

THE "WINDSPLITTERS"

A newspaper article dated September 11, 1896, stated that six 18 ft. closed cars were being rebuilt to 30 ft. length. The cars were cut in two, lengthened, vestibules added on both ends, and new main bracing placed under the floor. The cars seated 43 on longitudinal seats, weighed 10,000 lbs. less than #607-#626, and the heater (stove) was located entirely in the front vestibule. These cars were to be placed on the "Interurban" line by November 1, 1896.

Another article said these cars were rebuilt from six well-built, strong trailers which were too heavy to be good trailers.

~~These were the first cars to have the exterior entrance/exit door for the exclusive use of the motorman on the front vestibule~~. Records indicate four cars were actually completed. Probably six cars were needed to produce the four cars; that is, two cars provided the lengthening material.

As rebuilt the cars did not prove satisfactory because of narrowness and general lack of stability above the floor line. Consequently they were later placed on local lines instead of the "Interurban" line.

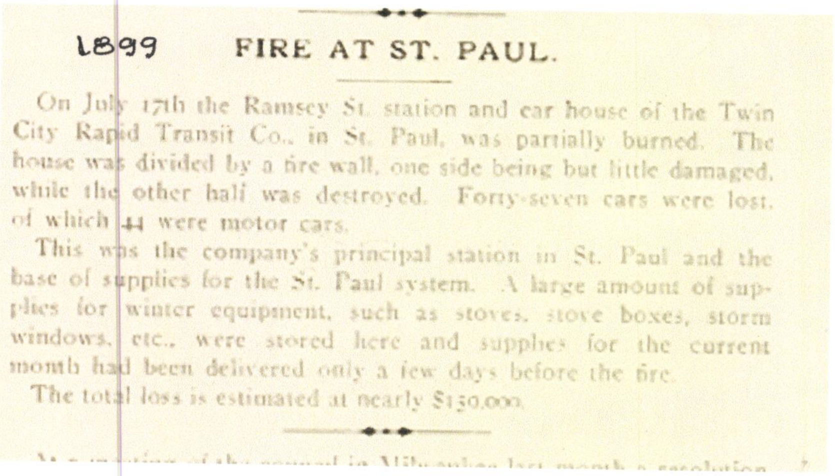
#732-#735, 44 ft. double-truck, closed motor cars rebuilt November 1896 in MSR shops from cars originally built by Pullman's Palace Car Company. The cars were probably equipped with Bemis M.T. trucks, two Thomson-Houston W.P. 50 motors, and TCRT series-multiple controller.

The 9-1-1904 mech. dept. record cards list them as "Windsplitters" but the reason for this nickname is unknown.

732-735 COMMENTS

The Pullman-built "heavy" closed horsecars would be 167-194, and 195-200. These were 16'3" six-window closed cars so two cars spliced together would produce a 32'6" 12-window closed car. Assuming the platforms were the same length (4'3") as those on 607-626 plus 9" bumpers would make the length overall 42'6", the same as 607-626. Thus it was not necessary to lengthen these cars. The 44 ft. length figure appears on the Mech. Dept. record cars prepared 9-1-1904. This was a round number TCRT used describing its newly-built (1898-1899) 43' 2 5/8" cars so I suspect it was also arbitrarily used for 732-735.

ST. RY. REVIEW



1899 **FIRE AT ST. PAUL.**

On July 17th the Ramsey St. station and car house of the Twin City Rapid Transit Co., in St. Paul, was partially burned. The house was divided by a fire wall, one side being but little damaged, while the other half was destroyed. Forty-seven cars were lost, of which 44 were motor cars.

This was the company's principal station in St. Paul and the base of supplies for the St. Paul system. A large amount of supplies for winter equipment, such as stoves, stove boxes, storm windows, etc., were stored here and supplies for the current month had been delivered only a few days before the fire.

The total loss is estimated at nearly $150,000.

◆

At a meeting of the council in Milwaukee last month a resolution

ANOTHER RAILWAY MOTOR.

CHANGES and improvements, resulting from experiments and experience, are constantly being made in street railway motors. Among the most recent is one devised by Gordon J. Scott, the chief electrician of the extensive Minneapolis Street Railway. Mr. Scott is a believer in strong, massive motors and has made this one of cast iron in the magnets, and iron wire core in the armature—the motor complete weighing 5,000 pounds.

The motor is made of cast iron in the magnets and iron wire core in the armature. Weight about 5,000 pounds total. Mr. Scott advocates good, heavy machinery of all kinds and consequently this motor is made on these lines. Massive and strong in every part, it will stand almost any kind of hard usage.

The motor is built on the salient pole type and as a consequence has but one field coil. This form gives a double magnetic circuit and these circuits also serve for holding the armature brasses in place. There are two pieces, wedge-shape, one on each side, that can be removed when armature is to be taken out. These pieces are held in place by large bolts and are pressed down tightly into place, making the joint come up snug.

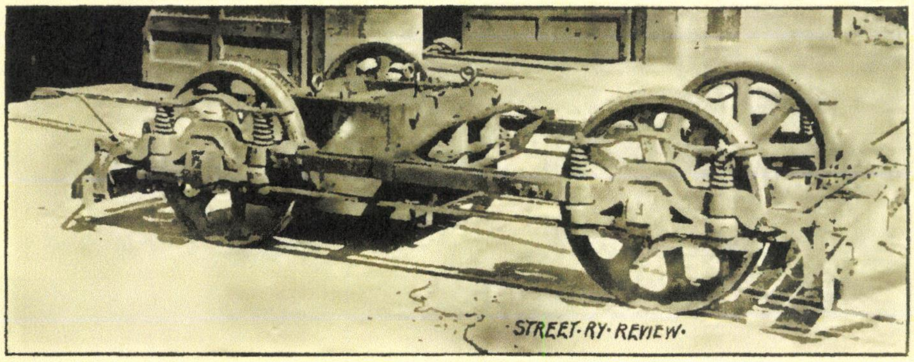
Theory points out that bearings should not be placed in magnetic circuits, though in this case no bad results have been met with owing to the construction, which is such as to allow the length and diameter of the armature to be of equal dimensions. This has also the effect of allowing a large armature diameter without making the axle gear very large, as the difference between centers of armature shaft and car axle is reduced to a minimum. The inventor states that, theoretically, objections will be plenty to the cast iron magnet, but adds that this was done for a purpose.

The motor has been made heavy that the adhesion between wheels and track would be sufficient to easily draw a loaded trailer with an empty motor car—on the same principle that locomotive engineers desire their engines to be capable of pulling large loads without carrying much of the load.

Single reduction gears are used. The speed of armature with 100 amperes at 500 volts is 186 revolutions, and car wheels turn at forty-five revolutions per minute, and of course, with the resistance in the circuit and the active E. M. F. cut down, the car barely moves but with tremendous power. The advantage in this is evident, permitting the car or cars to run into switches and curves with a positive motion, slow, yet powerful.

The maximum speed that the motor will give on one car is 30 miles an hour with an armature speed of 1,200 revolutions. It does not spark with heavy loads or with running at full speed with light loads. This is attributed to the very broad neutral space between poles, together with the cast iron poles. The magnetism cannot shift so readily in cast iron on account of saturation being more quickly reached. As to speeding the car up faster it is only a matter of changing gears.

Tests of the motor on the Minneapolis lines are reported as highly satisfactory.



SCOTT'S ELECTRIC MOTOR AND TRUCK.

FIRE IN BOSTON.

THE West End Road of Boston has suffered the loss of about $30,000 by fire. The stable situated at 320 to 324 Meridian street, East Boston, were discovered to be in flames about 9 o'clock. The alarm was promptly turned in, calling out a large detail of police and the fire department. The fire was located in the second story near the hay cutters, and spread with great rapidity in the rear of the buildings and into the surrounding structures. Ninety horses stabled on the first floor were turned loose on the street and escaped injury. The cars, to the number of 27 were damaged more or less, 15 being badly burned. In the loft there were 20 tons of hay and nearly 7 tons of other feed. The harness was saved by the active efforts of the employes. The entire structure, which is a total loss, was built in 1850, and ran 265 feet deep with a 65 foot front. The blacksmith shop was also here. The fire is supposed to have originated from the pipes of careless employes. The only consolation for the company is a good insurance, and the thought that it is only big companies that can have big fires.

Interurban Line
Street Railway Review   June 1891

Two-car trains: single-truck closed motor with single-truck open trailer.

The closed motors had woven wire gates on the pole side of the front and rear platforms.

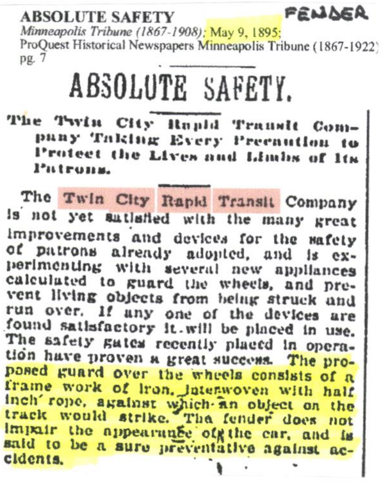
The open trailers all had woven wire guards the entire length of the car on both sides. Entrance was at the rear platform; center aisle. Woven wire gates on the pole side of the front and rear platforms.

Undated

"Put big open cars on LAKE HARRIET and MINNEHAHA lines. These cars now have automatic gates and lower step projecting out which folds up automatically when the gates close. Screens have been installed on both sides."

This work began in June 1896 so this order applies to 1896 or 1897. "Big open cars" were 540-547,549-551,555-568,and 707-731. 555-568 were ex Motor Line open trailers motorized in 1892. See the following newspaper article which indicates some of 555-568 were used on the MINNEHAHA line. "Whaleback" probably refers to the railroad-style roof used on these cars.

During the height of entertainment revival in 1901 the Minneapolis Journal described a nightly journey taken from Lake Harriet by H. M. Barnet, "concessionaire extraordinary at Lake Harriet, Como and Wildwood. Mr. Barnet has the refreshment privileges at these three famous street railway resorts and this sleeper is his private car, where he saves time by sleeping while traveling. He goes to bed at Lake Harriet every night, after a dip in the lake, and wakes up the next morning at Wildwood, three hours' ride away. The sleeper is one of the old "whalebacks," which used to run on the steam motor line and some of which are now to be seen on the Minnehaha line. Mr. Barnet's time is valuable and he has a good deal of territory to cover in a day. So he besought General Manager Goodrich to let him have the ancient car so that he could have it fixed up as a traveling home. Mr. Goodrich readily consented and so the car was done off into a suite of rooms with every convenience necessary to make it habitable. The train crew is paid by Mr. Barnet and it takes his car out of the Lake Harriet yards every morning at 1 o'clock after he has retired for the night. The car reaches Wildwood at about 4 a. m. Mr. Barnet gets up in the morning whenever it suits him and the crew snooze peacefully until about 11, when they go out on an advertising tour of the streets of the two cities, arriving eventually at Lake Harriet along in the afternoon, ready to take Mr. Barnet, who has made the day trip back meanwhile in the ordinary way, to Wildwood the next morning".



ABSOLUTE SAFETY FENDER
Minneapolis Tribune (1867-1908); May 9, 1895;
ProQuest Historical Newspapers Minneapolis Tribune (1867-1922)
pg. 7

ABSOLUTE SAFETY.

The Twin City Rapid Transit Company Taking Every Precaution to Protect the Lives and Limbs of Its Patrons.

The Twin City Rapid Transit Company is not yet satisfied with the many great improvements and devices for the safety of patrons already adopted, and is experimenting with several new appliances calculated to guard the wheels, and prevent living objects from being struck and run over. If any one of the devices are found satisfactory it will be placed in use. The safety gates recently placed in operation have proven a great success. The proposed guard over the wheels consists of a frame work of iron, interwoven with half inch rope, against which an object on the track would strike. The fender does not impair the appearance of the car, and is said to be a sure preventative against accidents.

Car Miles by Car Type

Year	Single truck	Double truck	Trailer	Total	Double truck %
1900	6,407,504	4,961,705	2,161,620	13,530,829	36.7%
1901	4,497,536	7,035,316	1,362,681	12,895,533	54.6%
1902	3,000,656	9,087,966	856,489	12,945,111	70.2%
1903	2,173,294	10,930,466	509,176	13,612,936	80.3%
1904	1,430,306	12,297,341	265,895	13,993,542	87.9%
1905	977,641	14,097,048	61,330	15,136,019	93.1%
1906	748,019	16,885,065	41,185	17,674,269	95.5%
1907	426,563	19,760,795		20,187,358	97.9%
1908	297,060	21,386,829		21,683,889	98.6%
1909	196,414	22,226,699		22,423,113	99.1%
1910	136,904	24,092,106		24,229,010	99.4%
1911	45,108	25,374,942		25,420,050	99.8%
1912	10,305	27,281,697		27,292,002	100.0%

JUMBO SNOWPLOW

CLEARS THE TRACK
Minneapolis Tribune (1867-1908); Jun 2, 1894;
ProQuest Historical Newspapers Minneapolis Tribune (1867-1922)
pg. 5

CLEARS THE TRACK

SNOW HAS NOW NO TERROS FOR THE STREET RAILWAY COMPANY.

A Twentieth Century Plow, the Invention of Master Mechanic Cooper, Has Been Constructed and Made Its Trial Trip on the Minnehaha Line Yesterday—The Test Wholly Satisfactory—Description of the Monster, Which Is Destined to Prove a Benefit to the Public and a Protection to Citizens Against the Ill Effects of Blizzards.

The winds may blow and the blizzard may howl and the snow drifts pile high, but the time when the Minneapolis citizen will have to bundle himself up and walk down town on a stormy morning because the cars on his particular line are blockaded is past. This may seem a rash statement, particularly with the remembrance of the great blizzard of last winter in mind, but it is nevertheless true and the fact is vouched for by the successful trial yesterday afternoon by the Twin City Rapid Transit Company of the new monster snow plow, the construction of which has been so carefully watched for the last three months.

The street railway officials are particularly proud of this latest addition to the equipment of their rolling stock, and they have guarded it under lock and key since the first steps in its construction were taken. The reason for the care they have exercised lest any one should chance to see the plow lies in the fact that it is "sui generis," the only one of its kind, and Master Mechanic Cooper, whose invention the plow is, has not wished the public to know anything about it until its successful working had been demonstrated. Now that it has, Mr. Cooper is the proudest of the proud, and yesterday afternoon as he stood in the cab in the front of his big machine he could not keep the little smiles from chasing themselves around the corners of his mouth as the steel wing of the mighty plow pushed the billows of snow far from the tracks.

The plow itself is a monster. Its weight is 22 tons, and 10 motors are required to run it. Two trolley poles are used to draw enough of the "electric fluid" from the wires, and a heavy iron crane is swung from one side for the suspension of the big steel wing which cleans the ground to a space of 15 feet from the rail. This wing itself weighs more than a ton and a half, and is so large that it is raised and lowered or set at the proper angle by machinery operated by electricity. In its construction half inch iron plates, reinforced by steel T rails weighing 60 pounds to the foot, have been used, and it is further braced by pieces of heavy hardwood timber. In appearance the plow looks like a freight car, with a cab, like that of a locomotive, in front. Over all the length is 39 feet, five feet longer than a freight car, but it is not, of course, so wide. The windows of the cab are higher than the roof of an interurban car, and though the plow is not so long, yet is seems a great deal longer than the interurbans. In the cab are two rheostats by which the four 25-horse power motors which furnish the motive power are controlled, and back of it are the rheostats controlling the motors which move the wing. The motors which run the plow are on the axles, but the other six motors used for running the wing and the "scoop" in front are on the floor of the car itself.

This "scoop" is one of the features of the plow. The wing pushes the snow outside of the track away from the rails, but this takes care of everything between the rails. It is an inclined plane running from close to the ground to near the top of the cab, and it has high sides to keep the snow scooped up from going over its edges. Running in this inclined plane on endless chains are three sets of conveyers, little paddles of wood set at right angles to the plane, and when the chains are set in motion these conveyers catch the snow in the "scoop" and carry it to the top. As the snow reaches the top it is dropped on a set of conveyers running at right angles, and is thus cast out at the side of the plow in front of the big wing, where it is shoved off at the side with the snow which the wing is pushing away from the outside of the track.

In the trial trip made yesterday a start was taken shortly after dinner from the Thirty-first street station. The track selected for the experiment was down on the Minnehaha line, where the snow had not been cleared away since it first fell and in places it was over three feet deep. In it there was a crust of ice formed by the recent rains, and in places as the wing pushed its way through the drifts great pieces, eight or ten inches thick and three or four feet square would be hurled off to one side. At times at least a ton of snow would be carried in front of the wing. Down near Minnehaha the wing struck three boulders, all within 10 feet of each other, and each of them larger than a bushel basket. They were all buried under the snow and so escaped detection until the jar was of striking them was felt by the plow. The first was torn from the ground where it was frozen in some six or eight inches, but the wing slid harmlessly over the others. The "scoop" in front was not used, as there was no snow on the tracks, but there is no question as to its working. The trials with the wing were most satisfactory.

The plow was so large that in going down to Minnehaha care had to be exercised in going around curves and in passing the "cut-out" boxes on the poles between the tracks. The boxes are high above the tops of the ordinary cars, bu[illegible] number of them had to be moved before the plow could pass. Under the railway bridge on south Washington avenue the plow just made it by a tight squeeze.

General Manager Hield and Supt. Smith headed the party which made the trial. Both of them expressed themselves as highly pleased with the result of the run and over the fact that the successful working of the plow would enable the company to give the public so much better service in case of severe snow storms or blizzards.

WINDSPLITTERS

THE FALL STYLE
Minneapolis Tribune (1867-1908); Sep 27, 1896;
ProQuest Historical Newspapers Minneapolis Tribune (1867-1922)
pg. 7

THE FALL STYLE

STREET RAILWAY COMPANY INTRODUCING INNOVATIONS.

Interurban Line to Have Light Cars—Weigh 10,000 Pounds Less Than the Present Stock—Seats Run Lengthwise of the Car—If the Experiment Proves a Success, They May Be Used Entirely—Every Electric Car in the Twin Cities to Receive a New Coat of Lemon Colored Paint—Matter of Coloring Important Item With Twin City Rapid Transit Company—Have 1,000 Cars in All.

Before November 1, the Interurban street car line will be supplied with cars that weigh 10,000 pounds less than the present Interurban cars. The new vehicles will not be any smaller, but simply lighter in construction, and for that matter, also lighter in color.

The street railway company in placing these lighter cars on this most important of all the lines, is making an experiment that is almost sure a success. There really is no need of great weight in the Interurban cars, when one comes to think of it. The new cars, six in number, will supplement the present Interurban equipment. They are as long as the Interurbans, and the bench seat system facing the center of the car, is used. The same trucks and gearing now in operation on all the cars of the Interurban line will be used with the new cars, but the body of the car will be set nearer to the ground, both for the sake of convenience and safety. The new cars will seat 43 people, and the standing room is, of course, much greater than in the present cars owing to the arrangement of the seats. The car heater will be situated in the motorman's vestibule instead of being partly in the car as in the present Interubans, and hot water heating pipes will traverse the entire length of the cars under the seats.

'The new cars, are not entirely new. They are made as follows: A half dozen good strong trailers are the basis of construction. These cars are selected for their strength, and because they are too heavy to make good trailers. They are cut in two in the middle and spliced together by a section of sufficient length to make the entire car as long as the Interurban cars now used. The main bracing under the flooring is new, the entire length of the car, and is made especially strong. In fact, the new cars will be remarkable principally for their strength and lightness.

If the experiment with these light cars proves a success, it is likely that the Interurban equipment will be made on that plan. These experimental cars themselves will ultimately be run on some of the busiest lines in the city in place of the double coach trains.

The brand new lemon-colored suits in which some of the street cars are beginning to make their appearance is attracting much attention. Since comment costs nothing, much of it is being made, both favorable and otherwise. At the street railway headquarters yesterday, it was learned that the work of painting all the cars, both in Minneapolis and St. Paul, is being pushed as rapidly as possible and still not interfere with the operation of the lines. About 15 cars per week are turned out of the shops, resplendent in their new coats of lemon, trimmed in green, bronze and silver. It makes a very neat and dainty looking car. Those in the shops yesterday looked far too dainty to venture out into the muddy streets. The least scratch or touch of dirt will show upon them plainly, but this very fact may be a good thing for the public, because the street car company would naturally feel obliged to keep the cars in a perfect state of spotlessness, more so than it would of the color were darker and did not show dirt easily.

The choice of the color is said to have been made by C. G. Goodrich, the affable vice-president of the company. The mixture contains the same stock as the color formerly used, the shade of coloring matter only varying. When the question of repainting the cars came up, there were several suggestions considered, among them the proposition to paint the cars a maroon color, similar to that of the Great Northern railway coaches.. Of course, that color would be the most durable and would withstand all sorts of dirt and abuse, but it would make the cars look heavy, and it would also be rather too radical a change to make without good reasons for doing so. The street car officials seem to feel that they have made the proper selection in the lemon color, and it remains to be seen whether they will sour on it.

The whole equipment of cars in Minneapolis and St. Paul is to be painted lemon color, save perhaps a few of the old trailers which will soon pass into a decline. There are 1,000 cars in the two cities, 70 per cent being in Minneapolis. At the rate they are now being turned out of the shops, it will be considerable time before the transformation is complete.

Passing of "Dinky" Gars Revives Old Memories
Minneapolis Morning Tribune (1909-1922); Jul 10, 1910;
ProQuest Historical Newspapers Minneapolis Tribune (1867-192
pg. 8

Passing of "Dinky" Cars Revives Old Memories

But Three Lines Left Where the Single-Truck Cars Are Maintained.

"Bob" Conveyances Soon to Be Consecrated to the Sale of Wieners and "Dog."

Along with the stage coach and other picturesque but primitive modes of conveyance, the short single-truck street cars, variously known as "dinkies," "dummies" and "bob" cars, have become almost a thing of the past in Minneapolis. In the early days they comprised the entire rolling stock of the street railway company, but gradually their use became restricted to the extension lines running outside the city limits. At present there are only three of these old lines in operation—the Fort Snelling branch, the Camden line and Robbinsdale extension. The short car on the Robbinsdale line has recently been replaced by a standard car, and the street car company officials say that as soon as the city finishes laying water pipes in the vicinity of Camden, the old cars on that line will also be sent to the junk heap or be consecrated to the sale of sausages and red hots.

Once seen, these cars were a never-to-be-forgotten sight. They bobbed along with an insouciance that evoked both wonder and laughter. It is claimed that by reason of their characteristic kangaroo motion many a country housewife boarding the car with home produce found her milk turned to butter before she reached her destination. It used to be a moot question whether it was easier to ride on one of these cars in a sitting or standing posture. The adherents of the latter faith declared that by raising oneself off the floor one could experience a delightful swinging motion, while those who preferred the seats say that for sensations the modern scenic railway cannot be compared with the old "bob" car.

THE "NORTH ST.PAUL PUPS"

TCRT acquired the St.Paul & Suburban Railway, originally the St.Paul & White Bear Railroad (and before that the North St.Paul Railroad) in June 1898. Their eight cars, #1-#8, were 34 ft. long overall, closed, wood underframe, double-truck motor cars built by Pullman's Palace Car Company, Detroit Shops, in 1892. Photographs indicate they were equipped with McGuire #20 trucks, but the original type of motors and controller is unknown. TCRT had an order of 30 cars under construction, #759-#788, at the time the extension to Stillwater was also under construction. The eight St.Paul & White Bear R.R. cars then became #789-#796 before TCRT began construction of the next car order, #797-#816. There is no indication as to the source of the nickname.

DOUBLE-END CARS

An S.W.O. dated August 1902 covered the repair and repainting of 20 double-end cars. This may be the total number of double-end cars operated at that time. We have photographs of #A352 (signed for the "Jackson St." line), #407 and #416.

An S.W.O. issued in 1905 covered equipping 13 double-end cars with SRG motors and K-11 controllers. Based upon the mech. dept. record cards these 13 cars were probably MSR 373, 376, 384, 389, 400, 414, 416, 417, 419, 421 and SPCR 335, 344, 358.

Another S.W.O also issued in 1905 covered the repairing and repainting of 12 double-end cars. "Repairing" apparently meant rebuilding to double-end operation. According to a mech. dept. data sheet the following 12 cars, all Northern Car Co.-built, were rebuilt for double-end operation:

505 and 509	11-15-1905
510 and 513	10-26-1905
516 and 524	11-06-1905
536 and 538	10-20-1905
1511	10-18-1905
1523 and 1529	10-28-1905
1534	11-11-1905.

Interestingly, there are no mech. dept. record cards for seven cars: 505,509,510,513,516,536 and 538. The record cards for the other five cars provide varnish dates:

524	11-11-1905
1511	10-18-1905
1523	11-20-1905
1529	10-28-1905
1534	10-30-1905.

In 1909 cars 505,510,516,536,1523 were assigned to 31st St. Station which operated the "Robbinsale Extension" and "Camden Extension" lines; cars 509,513,538 were assigned to Snelling Station which operated the "Ft. Snelling Extension" line. Car 1511 was the Owen St. Station double-end car in 1905; later it was on the "Robbinsdale Extension" line. Car 1529 may have replaced 538 on the "Ft. Snelling Extension" line in 1911. Car 1534 was on the "Camden Extension" line in 1911.

DISPOSITIONS OF EQUIPMENT 1893-1904

The old horsecar barns at University Ave. and Kent St., St.Paul, had been used since 1891 to store unused and disabled cars. February 21, 1896 the buildings were destroyed by fire along with approximately 100 cars. About 50 of these cars were in good condition but were being stored because they had not been fitted with front vestibules. The loss probably included all of the cable grip cars not required for service on the "Selby Avenue" line.

BASICS
40135

The Smith Ave. Carhouse in St.Paul was the scene of another disastrous fire, July 17, 1899, which destroyed the north half of the building along with 40 Open Cars and 20 Closed Cars. (see Article)

An article dated February 16, 1900, reported that 30 single-truck, closed motor cars were being rehabilitated and equipped with front vestibules. These cars had been purchased new for the electric lines but had been in storage since 1893 because of the financial panic and had never been fitted with vestibules. It was said that they were of the same size as the standard single-truck cars but differed in windows, ventilators and shape and finish of roof. The same article also reported that all open cars were being overhauled.

During 1902 TCRT began to retire the original electric equipment as by this time they had 225 "large" cars out of approximately 600 motor cars. In September 1902 old cars to be scrapped were being stripped.

A Minneapolis newspaper article in November 1902 reported that the company was dumping old carbodies in a lot near Bryant Ave. S. and 31st St.; people could chop them up for firewood and the company would then burn the remains to get the scrap metal. A description of several cars was given.

#152 was a dumpy green car, a horsecar used on Washington Ave., pulled by two horses. It had wooden seats and was later used as an electric car trailer.
#350, one of the first electric cars, lay wrecked and forgotten beside #152.
Other cars left to perish were numbered as high as #1546.

The 1902 U.S. Census provides some interesting figures to compare with the Frank Trumbull Reports of 1-18-1893 and 6-9-1894. The figures do include cars built in TCRT shops since 1898 but these quantities are capable of being segregated. The figures are summarized on the following page.

In May 1903 two cars were sold to Great Falls St. Ry., Montana.

In the book STREETCAR HOUSE by Donald Hough, the author related how his father built a house at 941 Mahtomedi Ave., Mahtomedi, out of retired streetcar bodies. TCRT was in the process of of disposing of the many trailers which had been converted from horsecars. The trucks were removed and the bodies dumped and burned wherever a place could be found, and they were running out of places where this could be done without creating either a nuisance or a hazard. His father had requested TCRT for three old carbodies, but the company, delighted to get rid of them, built a temporary side track into the woods off the Mahtomedi line at the East Shore Park stop and promptly delivered 10 carbodies, then more and more until a total of 22 carbodies had been pushed off their trucks alongside the track. His father asked TCRT to take back 12 carbodies, but in the meantime the trucks had been hauled away and the temporary side track removed. So 15 carbodies were used in building the house and seven carbodies were left in the woods of which eventually six were sold to other persons and one was used for a waiting station at the East Shore Park stop. The carbodies were delivered in April or May 1905. The author describes the interior of a 16 ft. closed carbody, six windows per side, which contained a LaClede Car Company builder's plate; it had red upholstered longitudinal seats, slatted floor composed of oak strips bound by metal bands, cherry wood interior trim, sliding vestibule doors, zinc-lined alcove in one end in which stood a conical cast iron stove, and on the opposite side was a similar alcove containing the coal bin.

The construction journals in June 1904 recorded expensitures for dismantling closed cars.

1902 U.S. CENSUS

Description	Total	Motors	Trailers
Closed Passenger Cars	585	466	119
Open Passenger Cars	301	173 (1)	128
Subtotals	886	639	247
Work Cars	19	19	
Snow Plows	20	20	
Snow Sweepers	1	1	
Selby Hill cars	3	3	
Private Car	1	1	
Totals	930	683	247

Quantity of Cars with:

Air Brakes	58	(2)	
Track Brakes	3	(3)	
Fenders	659	(4)	
Electric Heat	1	(5)	
Stove Heat	229		466 Closed Cars
Hot Water Heat	237	(6)	

(1) As of 9-1-1904:	540-547,549-551,707-731	36 cars
	627-691	65 cars
	1303-1362 series	13 cars
	1570-1634 series	53 cars
		167 cars

(2) Private car, 779-785, 900-949.

(3) Selby Hill Cars

(4) 639 Passenger Motor cars, 19 Work cars, 1 Private car.

(5) Private car.

(6) Probably 540, 608-626, 732-735, 737-788, 789-796, 797-949. (607 wrecked.) The TCRT 1902 Annual Report stated they now had 225 "large cars": probably 607-626, 737-788, 797-949; or, included the Private car instead of 607 which had been wrecked.

As of 1902:

Bemis single trucks	327

Two-motor sets in use:

W.P. 50	165
Thomson-Houston SRG	43
Sprague	290
Total	498

Reconciliation of Quantities 1893 to 1904

	1-18-1893	Disposed of 1893-1902	1902 US Census	Disposed of 1902-1904	9-1-1904	
Closed Motors						
14 ft. Sgl Trk	13	(13)	0		0	
16 ft. Sgl Trk	5	(5)	0		0	
18 ft. Sgl Trk	234}	(74)	229	(51)	{142	
22 ft. Sgl Trk	69}				{ 36	
Subtotal	321	(92)	229	(51)	178	
41 ft. Dbl Trk	20	(1)	19		19	
Totals	341	(93)	248	(51)	197	
Open Motors 6-9-1894						
18 ft. Sgl Trk	9	(9)	0		0	Ex Cable Grip Cars
24 ft. Sgl Trk	60	(47)?	13		13	1303-1362
27 ft. Sgl Trk	80	(15)	65		65	627-706
28 ft. Sgl Trk	65	(6)?	59	(6)?	53	1570-1634
34 ft. Dbl Trk	25	(14)	11		11	540/551 (11) plus 555-568 (14)
40 ft Dbl Trk	25		25		25	707-731
Totals	264	(91)	173	(6)	167	
18 ft. Open Cable Grip	38	(35)	3		3	
Closed Trailers						
14 ft. Electric	35	?	?	?	1	no. 135 remained
16 ft. Electric	74	?	?	?	5	nos. 147,179,183,185,195 remained
16 ft. Cable	34	?	?	?	11	from 303-327 series remained
Totals	143	(24)	119	(102)	17	
Open Trailers						
24 ft. Electric	82		82	(24)	58	201-262,423-442
25 ft. Electric	15		15		15	}
25 ft. Cable	32	(1)	31	(1)	30	} 200-245 (213 gone 1902-1904)
Totals	129	(1)	128	(25)	103	

Sept 1904 Inventory Cards

	Description	Builder	Date	Lowest No.	Highest No.	Cost/Car
Mpls	24' Open Trailer	Pullman	7-11-88	202	232	$705
	24' Open Trailer	Jones	6-7-88	233	262	$685
	22' Closed Motor	Jones	Reblt 2-91	284	-	$900
and St Paul	18' Closed Motor	La Clede	2-91 and 2-20-91	331	421	331-58 $900 363-421 $950
	18' Closed Motor	La Clede	2-91	1364	1369	$900
	24' Open Trailer	R&M	3-3-91	423	442	$650
	18' Closed Motor	Jones	8-4-91	443	501	$1150
	26' Open Motor	La Clede	12-9-90	1305	1361	$625
	18' Closed Motor	Northern	7-30-91	503	537	$1100
	30' Open Motor	Northern	4-15-92	540	551	? $1050
	22' Closed Motor	Jones	Reblt 7-1-92	570	606	$1200
	16' Closed Horse Cars	Pullman	8-16-86			$1100
	44' Closed Motor	Pullman	Reblt 11-96	732	734	$1828.67
St Paul	25' Open Trailer	La Clede	9-1-88	A200	A216	$875
	25' Open Trailer	La Clede	12-20-88	A217	A235	$775
	25' Open Trailer	La Clede	4-90 or 4-1-90	A236	A238	$775
	25' Open Trailer	La Clede	8-90	A239	A245	$775
	16' Closed Trailer	La Clede	12-20-88	303	316	$950
	16' Closed Trailer	La Clede	8-20-90	322	323	$950
	18' Closed Motor	Stephenson	5-91	1505	1539	$1250
	18' Closed Motor	Brownell & Wight	Reblt 6-92	567	569	$1200
	27' Open Motor	American	1-19-93	627	691	-
	40' Open Motor	American	1-6-93	707	731	-
	28' Open Motor	La Clede	1-19-93	1570	1634	-

Sept 1904 Inventory Cards

Northern	Stephenson
503	
507	505
508	1508
1511	511
512	
514	1513
515	
517	1516
1518	518
519	
520	
521	
522	
1523	
524	
525	
526	
1527	527
528	
1529	
530	
531	
1532	
1534	
1535	
+ 536 *	
537	
+ 538 *	1538
–	1539

* No record cards, but on a list of cars rebuilt Double End in 1905 and on a 1911 scrapping list.

LaClede 2.91	LaClede 2-20-91
331-381	382-384
385	387-397
400, 412, 413	402-408
417, 421	414-416
1364, 1366, 1369	419
Note: there are both a:	
364	1364
366	1366
369	1369

MSA 303-362 or 1303-1362 60 cars
13 cars remained at 9-1-04:

1305
1308
1313
1325
1332
1335
1338
1340
1343
1347
1353
1356
1361

CAR ORDERS: HISTORY AND DISPOSITION FROM THE RECORD CARDS

MSR 112-136 (?), Brownell & Wight 2-1-1884, 14 ft. Closed Horsecars: 25 cars. All but one, 135, had been disposed of by 9-1-1904.

135 Horse Car, Brownell 2-1-1884, 16 ft. (sic) Trailer. Converted to Salter 2-6-1904. At East Side Station. Scrapped 1-2-1906.

MSR 137-166 (?), John Stephenson Co. 1885, 16 ft. Closed bobtail Horsecars: 30 cars. Five-large-window body, bombay roof. Front and rear platforms rebuilt for use as electric car trailers. Wheel pedestal mounts were changed when cars were converted from narrow gage to standard gage. Photo of 154 Trailer was taken in 1904 but there is no record card for this car. Apparently all had been disposed of by 9-1-1904.

MSR 167-194, Pullman's Palace Car Co. 8-16-1886, 16 ft. Closed Horsecars: 28 cars. Six-window body, deck roof, front and rear platforms. These were considered substantial well-built cars. (Photos of 167,181,188,190 are identical.)The first electric motor cars were ten cars from this order with two 15 h.p. motors. Other cars from this order were used as trailers on the first electric line (photo of 188 motor and 190 trailer). All except three, 179,183,185, had been disposed of by 9-1-1904. S.W.O.: October 1902, two Salters were made from "condemned motor car bodies" 179 and 185. (The record cards give the date as 1903.) S.W.O.: December 1903, 183 was equipped for use as the Selby Sand Car.

179 converted to Salter 10-1902. East Side Station. Scrapped 10-20-1906.

183 S.W.O.: converted to Selby Sand Car 12-16-1903. (Record card shows it as Selby Salter.) No seats, exits DE, all gates gone. Later used at Smith Ave. Carhouse. Scrapped 7-24-1911.

185 converted to Salter 10-1902. No seats, exits DE, no gates-all entrances closed. Scrapped 7-24-1911.

MSR 195-200, Pullman's Palace Car Co. Chicago Shops order #505. 16 ft. Closed Horsecars: 6 cars. Four cars sold 2-24-1887 to MSR as 195-198 and two cars sold 3-24-1887 as 199-200. Apparently these were identical in appearance to 167-194 as a photograph of 195 is identical to the photographs of 167,181,188,190. All except one, 195, had been disposed of as of 9-1-1904.

195 S.W.O.: "condemned motor car body" was converted to a Salter during October 1902 (record card lists it as a Salter and gives the date as 1903). Smith Ave. Carhouse Coal Car, poor condition 4-1-1910. Scrapped 7-24-1911.

SPCR 129-144, Pullman's Palace Car Co. Chicago Shops order #519 6-29-1887, 16 ft. Closed Horsecars: 16 cars. Six-window body, deck roof, front and rear platforms. Used instead as Cable Trailers. Some were later used as Electric Trailers (at least nine for the first line). Photograph of 136 on first electric train 2-24-1890; 131 may be another Electric Trailer. All had been disposed of by 9-1-1904.

SPCR 145-150 (?), Brownell & Wight, 188?, 14 ft. Closed Horsecars: 6 cars. Five-window body, deck roof, front and rear platforms (photo of 151). Later used as Electric Trailers. All except one, 147, had been disposed by 9-1-1904.

147 Sander, Brownell 14 ft. Trailer. Midway Carhouse. Scrapped 12-12-1905.

MSR 201-232, Pullman's Palace Car Co. Chicago Shops order #545 3-26-1888, 24 ft. Open Horsecars: 32 cars. The record cards date built is 7-11-1888. Deck roof, 8-bench (transverse, reversible), footboards on both sides. As Electric Trailers had footboards removed, longitudinal bench seats (the transverse seats re-arranged), rear exit and no gates.
10 cars had been disposed of by 9-1-1904: 201,204,205,210,215,216,218,222,227 and 228.
22 cars, dispositions:

202	Scrapped 11-20-1908
203	Scrapped 11-19-1904
206	Scrapped 10-20-1904
207	Sold to Fargo & Moorhead St. Ry. 6-13-1906
208	Scrapped 11-19-1904
209	Scrapped 11-20-1908
211	Scrapped 11-19-1904
212	Scrapped 10-11-1904
213	Sold to Fargo & Moorhead St. Ry. 6-13-1906
214	Scrapped 10-11-1904
217	Scrapped 10-11-1904
219	Sold to Fargo & Moorhead St. Ry. 6-13-1906
220	Scrapped 10-20-1904
221	Scrapped 10-11-1904
223	Scrapped 10-11-1904
224	Sold to Fargo & Moorhead St. Ry. 6-13-1906
225	Sold to Fargo & Moorhead St. Ry. 11-13-1905
226	Sold to Fargo & Moorhead St. Ry. 11-13-1905
229	Scrapped 10-20-1904
230	Scrapped 10-11-1904
231	Scrapped 10-20-1904
232	Scrapped 10-20-1904

MSR 233-262, J. M. Jones' Sons Car Co. 6-7-1888, 24 ft. Open Horsecars: 30 cars. 8-bench (transverse, reversible), footboards both sides. As Electric Trailers had the footboards removed, longitudinal bench seats (the transverse seats re-arranged), rear exit and no gates.
5 cars disposed of by 9-1-1904: 240,241,243,251,253.
25 cars, dispositions:

233	Track Dept. Flat Trailer 7-24-1906. (S.W.O.: one single-truck flat trailer; first expenditures incurred in March 1906.) Scrapped 6-1912.
234	Scrapped 9-28-1908
235	Sold to Fargo & Moorhead St. Ry. 11-13-1905
236	Scrapped 10-20-1904
237	Scrapped 10-20-1904
238	Sold to Fargo & Moorhead St. Ry. 11-13-1905
239	Scrapped 10-20-1904
242	Scrapped 10-20-1904
244	Sold to Fargo & Moorhead St. Ry. 11-13-1905
245	Sold to Fargo & Moorhead St. Ry. 11-13-1905
246	Sold to Fargo & Moorhead St. Ry. 11-13-1905
247	Sold to Fargo & Moorhead St. Ry. 11-13-1905
248	Scrapped 10-20-1904
249	Sold 1-16-1906
250	Scrapped 9-10-1904
252	Scrapped 11-19-1904
254	Scrapped 11-19-1904
255	Sold 1-16-1906
256	Sold to Fargo & Moorhead St. Ry. 5-17-1905

257	Sold to Fargo & Moorhead St. Ry. 11-13-1905
258	Sold to Fargo & Moorhead St. Ry. 5-17-1905
259	Scrapped 6-1912
260	Sold to Fargo & Moorhead St. Ry. 11-13-1905
261	Sold to Fargo & Moorhead St. Ry. 5-17-1905
262	Sold to Fargo & Moorhead St. Ry. 11-13-1905

MSR 263-302,[284,569-606], J. M. Jones' Sons Car Co. - -- 1888, 16 ft. Closed Horsecars: 40 cars.
All 40 cars were converted to electric motor cars during 1890. One car was destroyed by fire caused by a faulty roof insulator, April 1891. One car, 284, carbody was rebuilt to 22 ft. length in the 3rd Ave. N. Shops during December 1891. The remaining 38 cars, carbodies were rebuilt to 22 ft. length in the 3rd Ave. N. Shops; the record cards carry a date built of 7-1-1892; they were re-numbered 569-606. Hand brakes, longitudinal seats, rear exit with single gates.

6 cars had been disposed of by 9-1-1904: 569,572,580,590,596,597.
33 cars remained.
One car,284, had one Bemis truck with two SRG motors, rheostatic control.
Six cars 570,576,577,579,581,595 were dismounted summer 1904 at 3rd Ave. N. Carhouse. The other 26 cars had one Bemis truck with 2 Sprague motors, rheostatic control.
Dispositions:

284	Burned 6-1912
570	Sold to St.Cloud St. Ry. 8-1907
571	Rebuilt to Snelling Mill Shop Switch Car. Scrapped 4-24-1912
573	Sold complete 9-20-1905
574	Sold complete 9-20-1905
575	Sold complete 9-20-1905
576	Sold to Kankakee Electric Ry. Co.,Ill., 4-2-1906
577	Sold to St.Cloud St. Ry. 8-1907
578	Sold complete 9-20-1905
579	Sold to St.Cloud St. Ry. 8-1907
581	Sold to St.Cloud St. Ry. 8-1907
582	Scrapped 4-24-1912
583	Burned 6-1912
584	Overhauled, equipped with vestibules, fitted with cane seats, and sold to Terre Haute, Ind., 11-27-1905
585	Scrapped 4-24-1912
586	Overhauled, equipped with vestibules, fitted with cane seats, and sold to Terre Haute, Ind., 11-27-1905
587	Sold to Mankato St. Ry. 1-13-1911
588	Scrapped 10-5-1908
589	Overhauled, equipped with vestibules, fitted with cane seats, and sold to Terre Haute, Ind., 11-27-1905
591	Burned 6-1912
592	Scrapped 11-1-1906
593	Scrapped 7-24-1911
594	Scrapped 4-24-1912
595	Sold to Devils Lake & Chautauqua Transfer Co. 9-17-1906
598	Burned 6-1912
599	Scrapped 9-28-1909
600	Sold complete 9-20-1905
601	Scrapped 10-10-1908
602	Burned 6-1912

603	Burned 6-1912
604	Scrapped 4-24-1912
605	Body Given Away for Cottage on White Bear Lake 2-28-1906
606	Scrapped 7-14-1911

SPCR [199?] 200-216, LaClede Car Co. 9-1-1888, 25 ft. 8-bench Open, deck roof, Horsecars or Cable Trailers: 17 or 18 cars. Footboards both sides; center aisle. As Electric Trailers: straight platforms, footboards removed, cross seats, center aisle, rear exit with no gates.
If there was a car number 199 it was disposed of before 9-1-1904.
1 car disposed of before 9-1-1904: 213.
16 cars, dispositions:

200	Burned 6-1912
201	Burned 6-1912
202	Rebuilt to Ash Car 1-12-1910; Burned 7-24-1911.
203	Sold to Aberdeen St. R.R., S.D., 5-1-1911
204	Burned 6-1912
205	Sold to Aberdeen St. R.R., S.D., 5-1-1911
206	Burned 7-24-1911
207	Scrapped 9-29-1909
208	Burned 7-24-1911
209	Burned 7-24-1911
210	Rebuilt to Track Dept. Flat Trailer 9-10-1906; Burned 6-1912
211	Burned 7-24-1911
212	Rebuilt to Scrap Car 4-14-1910; assume Burned 6-1912
214	Rebuilt to Track Dept. Flat Trailer 9-10-1906; Burned 6-1912
215	Burned 6-1912
216	Burned 7-24-1911

SPCR 217-235, LaClede Car Co. 12-20-1888, 25 ft. 8-bench Open, [redacted] railroad roof, Cable Trailers: 19 cars. Footboards both sides, center aisle. As Electric Trailers the footboards were removed, straight platforms, cross seats, center aisle, rear exit with no gates.
No cars had been disposed of prior to 9-1-1904.
19 cars, dispositions:

217	Burned 7-24-1911
218	Burned 6-1912
219	Burned 6-1912
220	Burned 6-1912
221	Sold to Interstate Traction Co. (Park Point) 5-15-1906
222	Rebuilt to Scrap Car 4-14-1910; assume Burned 6-1912
223	Burned 6-1912
224	Sold to Oskaloosa Traction & Light Co. 7-31-1906
225	Burned 6-1912
226	Sold to Interstate Traction Co. (Park Point) 5-15-1906
227	Burned 6-1912
228	Burned 6-1912
229	Sold to Interstate Traction Co. (Park Point) 5-15-1906
230	Sold to Oskaloosa Traction & Light Co. 7-31-1906
231	Burned 7-24-1911
232	Burned 6-1912
233	Scrapped 9-28-1908
234	Rebuilt to Track Dept. Flat Trailer 7-24-1906; Burned 6-1912
235	Burned 7-24-1911

SPCR 236-245, LaClede Car Co. 1890. The record cards have a date of 4-1-1890 on 236-238 and 8-20-1890 on 239-245, 25 ft. 8-bench, Open, railroad roof, Cable Trailers: 10 cars. Footboards on both sides, center aisle. As Electric Trailers the footboards were removed, cross seats, center aisle, rear exit with no gates.
No cars were disposed of before 9-1-1904.
10 cars, dispositions:

236	Burned 10-10-1908
237	Burned 6-1912
238	Burned 10-10-1908
239	Sold to Interstate Traction Co. (Park Point) 5-15-1906
240	Sold to Interstate Traction Co. (Park Point) 5-15-1906
241	Sold to Interstate Traction Co. (Park Point) 5-15-1906
242	Scrapped 9-19-1905
243	Burned 7-24-1911
244	Burned 7-24-1911
245	Sold to Oskaloosa Traction & Light Co. 7-31-1906

SPCR 303-317, LaClede Car Co. 12-20-1888, 16 ft. Closed, railroad roof, Cable Trailers: 15 cars. As Electric Trailers: straight platforms, longitudinal seats, front and rear exits with no gates.
6 cars disposed of prior to 9-1-1904: 304,306,311,312,314,317.
9 cars, dispositions:

303	Sold to Aberdeen St. R.R. (S.D.) 5-1-1911
305	Waiting Station at Inver Grove 10-14-1908
307	Horsecar (sic) skeleton only, no seats, used to haul coal at East Side Station; body Burned 10-15-1908
308	Sold to Aberdeen St. R.R. (S.D.) 5-1-1911
309	Burned 7-24-1911
310	Burned 7-24-1911
313	Burned 7-24-1911
315	Burned 7-24-1911
316	Burned 7-24-1911

SPCR 318-327, LaClede Car Co. 8-20-1890, 16 ft. Closed, railroad roof, Cable Trailers: 10 cars. As Electric Trailers: straight platforms, longitudinal seats, front and rear exits with no gates.
8 cars disposed of prior to 9-1-1904: 318-321,324-327.
2 cars, dispositions:

322	Given to B. H. Scriber by Mr. Pevear 12-16-1908
323	Burned 7-24-1911

MSR 303-362, LaClede Car Co. 12-9-1890, 24 ft. 8-bench Open, deck roof, Motor Cars: 60 cars. Cross seats, center aisle, footboards on both sides. When modified the footboards were removed, side screens installed, rear exit with single gates. Renumbered 1303-1362 to avoid duplication with SPCR numbers.
47 cars disposed of prior to 9-1-1904: 1303,1304,1306,1307,1309-1312,1314-1324,1326-1331, 1333-1334,1336-1337,1339,1341-1342,1344-1346,1348-1352,1354-1355,1357-1360,1362.
13 cars remained. Five cars 1305,1308,1313,1356,1361 had one Bemis truck, 2 Sprague motors, and rheostatic control. Eight cars 1325,1332,1335,1338,1340,1343,1347,1353 were indicated as "Rice St. 12-26-1903 Dismounted" (no trucks or motors).
Dispositions:

1305	Scrapped 7-24-1911
1308	Burned 6-1912

1313	Scrapped 7-24-1911
1325	Burned 6-1912
1332	Burned 6-1912
1335	Burned 6-1912
1338	Burned 6-1912
1340	Burned 6-1912
1343	Burned 6-1912
1347	Burned 6-1912
1353	Burned 6-1912
1356	Scrapped 7-24-1911
1361	Scrapped 7-24-1911

MSR 363-422, LaClede Car Co. 2-20-1891, 18 ft. Closed, Motor Cars: 60 cars. Seven-window, deck roof, body 18'7" long over bulkheads, 26'7" long overall. Hand brakes, longitudinal seats, rear exit with single gates.

28 cars disposed of prior to 9-1-1904: 368,371-372,374,379-380,386,388,391-396,398-399,401,404-407,409-411,415,418,420,422.

32 cars; notations: (1)= "3rd Ave. summer 1904 dismounted; (2)= one Bemis truck, 2 Sprague motors, and rheostatic control; DEV = double-end vestibuled; dispositions:

363 (1)	Sold to Butte St. Ry. 2-5-1906
364 (1)	Sold to Boise City Ry. 8-1907
365 (2)	Burned 7-24-1911
366 (1)	Sold to Butte St. Ry. 2-5-1906
367 (1)	Sold to Kankakee Electric Ry. Co. (Ill.) 4-2-1906
369 (2)	Burned 7-24-1911
370 (2)	Burned 10-6-1908
373 (2) DEV	Sold to Denison & Sherman Ry. (Texas) 3-16-1910
375 (1)	Sold to Butte St. Ry. 2-5-1906
376 (2) DEV	Sold R. L. Costigan 6-15-1906
377 (1)	Sold to Butte St. Ry. 9-13-1907
378 (1)	Sold GSK (letter 9-30-08), body only to Schuylkill Valley Ry., Penna., 10-1-1908
381 (2)	Given to Alderman Walker 10-28-1905
382 (1)	Sold to Butte St. Ry. 4-5-1906
383 (2)	Sold (no electrical equipment) to Danville St.Ry. & Electric Light Co. (Ill.) 9-29-1905
384 (2) DEV	Sold to Denison & Sherman Ry. (Texas) 3-16-1910
385 (2)	31st St. Wrecker (no seats, no gates); Scrapped 10-15-1907
387 (1)	Sold to Butte St. Ry. 9-13-1907
389 (2) DEV	Scrapped 11-2-1905
390 (1)	Sold to Butte St. Ry. 4-5-1906
397 (2)	Burned 7-24-1911
400 (2) DEV	Burned 9-27-1909
402 (1)	Sold to Butte St. Ry. 9-13-1907
403 (1)	Sold by George H. Hayes to A. S. Partridge, a used streetcar dealer, 2-19-1908 Arthur S. Partridge Co. St Louis, Mo.
408 (1)	Sold (body only), Henderson Traction Co. (Kentucky) 5-23-1907
412 (1)	Sold GSK (letter 9-30-1908), body only to Schuylkill Valley Ry., Penna., 10-1-1908
413 (1)	Sold (body only), Henderson Traction Co. (Kentucky) 5-23-1907
414 (2) DEV	Sold to Mankato Electric Traction Co. 4-16-1910
416 (2) DEV	Scrapped 10-28-1905
417 (2) DEV	Burned 7-24-1911
419 (2) DEV	Sold to a line in Nebraska 8-20-1906

421 (2) DEV	???	10-20-1906

SPCR 328-369 LaClede Car Co. 2-1891, 18 ft. Closed Motor Cars: 42 cars. Seven-window body, deck roof, body 18'7" long over bulkheads, 26'7" long overall. Hand brakes, longitudinal seats, rear exit with single gates.

24 cars disposed of prior to 9-1-1904: 328-330,337-338,340-343,346,348-351,355,357,359-363,1365 DEV, 1367-1368.

18 cars; notations: (1) = "3rd Ave. summer 1904 dismounted; (2) one Bemis truck, 2 Sprague motors and rheostatic control; DEV = double-end vestibuled; Dispositions:

331 (1)	Sold to Butte St. Ry. 9-13-1907
332 (1)	Scrapped 7-24-1911
333 (2)	Sold to Boise City Ry. 2-26-1906
334 (1)	Sold to Butte St. Ry. 4-5-1906
335 (2) DEV	Scrapped 7-24-1911
336 (1)	Sold to Butte St. Ry. 4-5-1906
339 (1)	Sold (body only) to Henderson Traction Co. (Kentucky) 5-23-1907
344 (2) DEV	Sold to Denison & Sherman Ry. (Texas) 3-16-1910
345 (2)	Scrapped 9-30-1908
347 (2)	Scrapped 10-6-1908
352 (1) DEV	Sold to Butte St. Ry. 4-5-1906
353 (1)	Sold to Butte St. Ry. 4-5-1906
354 (2)	Sold (body only) to Danville St. Ry. & Lt. Co. (Ill.) 9-29-1905
356 (2)	Scrapped 7-24-1911
358 (2) DEV	5-11-1905 two K-11 controllers; 1-2-1906 two SRG motors. Scrapped 10-27-1908
1364 (2) DEV	Scrapped 1-27-1911
1366 (1)	Sold to Butte St. Ry. 2-5-1906
1369 (2)	Scrapped 10-1-1908

MSR 423-442 Robinson & Moan 3-3-1891, 24 ft. 8-bench Open Motor Cars: 20 cars. Footboards on both sides, cross seats, center aisle. The motors were removed in December 1891. Thereafter the cars were always used as Trailers. After modifications: footboards removed, side screens added, cross seats, rear exit with no gates.

7 cars disposed of prior to 9-1-1904: 425,426,428,430,431,433,440.

2 cars "Scrapped account of decay 10 or 15 years ago":432,436.

11 cars, Dispositions:

423	Track Dept. Flat Trailer 4-9-1906; Burned 9-28-1908
424	Track Dept. Flat Trailer 7-24-1906; Burned 9-28-1908
427	Track Dept. Flat Trailer 3-29-1906; Burned 9-28-1908
429	Track Dept. Flat Trailer 4-9-1906; Burned 6-1912
434	Track Dept. Flat Trailer 4-6-1906; Burned 6-1912
435	Track Dept. Flat Trailer 4-9-1906; Burned 6-1912
437	Track Dept. Flat Trailer 7-24-1906; Burned 9-28-1908
438	Track Dept. Flat Trailer 4-9-1906; Burned 6-1912
439	Scrapped 10-11-1904
441 442	Track Dept. Flat Trailer 4-6-1906; Burned 6-1912

NOTE ▶

448: the record card disposition shows it as burned 6-1912. However 448 was the last sigle truck passenger car to be operated by TCRT. It was sold to the Great Northern Ry. complete. It was shipped April 22, 1913, to the G. N. Ry. in Superior, Wisconsin, where it was placed in service as a shuttle car for company employees in the Allouez yards which served the Superior ore docks.

april 1904: Place vestibule on one old Jones car sold to A. B. Robbins.

487: still in existence at
1-30-1921 parked on a short
piece of single track beside
the Engineering Building:
awaiting the building of a
museum to shelter it.

MSR 443-502 J. M. Jones' Sons Co. 8-4-1891, 18 ft. Closed Motors: 60 cars. Hand brakes, longitudinal seats, rear exit with single gates.
10 cars disposed of prior to 9-1-1904: 454-455,464,477-478,484,488,493,496,502.
50 cars remained.

Equipment:

6 cars "3rd Ave. summer 1904 dismounted" 457,460,463,479,486,498.

44 cars one Bemis truck, rheostatic control; two Sprague motors 466-468,474,476,481,482,491,494,500,501; two SRG motors 443-453,456,458,459,461,462,465,469-473,475,480,483,485,487,489,490,492,495,497,499.

Dispositions:

443	Burned 7-12-1910
444	Sold to Mr. Holmes of Kansas City-Leavenworth line 8-24-1905
445	Burned 9-28-1909
446	Burned 4-24-1912
447	Storehouse Switcher 5-20-1906. While being used to haul Track Dept. Trailers, the end was pulled out, Burned 9-27-1910.
448	Rebuilt to Sand Car 11-28-1905 (seats removed) (E. 7th St.). Burned 6-1912 SEE NOTE ◀
449	Cable Car for Elect. Dept. 12-15-1905 (seats removed). Burned 7-12-1910
450	Sold to Mr. Holmes of Kansas City-Leavenworth line 8-24-1905
451	Motors removed 11-11-1905. Burned 11-20-1908
452	Motors received #11 winding 9-9-1904. Rebuilt to Sand Car 12-2-1905 (seats removed) (31st St.); automatic feed device 12-22-1906. Burned after being damaged 9-27-1910
453	Burned 7-10-1910
456	Scrapped 3-23-1906
457	Sold GSK (letter 9-30-1908), body only to Schuykill Valley Ry. (Pa.) 10-1-1908
458	Burned 10-15-1908
459	Sold to Mr. Holmes of Kansas City-Leavenworth line 8-24-1905
460	Sold GSK (letter 9-30-1908), body only to Schuylkill Valley Ry. (Pa.) 10-1-1908
461	Sold to Mr. Holmes of Kansas City-Leavenworth line 8-24-1905
462	??? 10-20-1906
463	Sold GSK (letter 9-30-1908), body only to Schuylkill Valley Ry. (Pa.) 10-1-1908
465	Motors removed 11-11-1905. Burned 7-24-1911
466	Sold to Fargo & Moorhead St. Ry. 11-13-1905
467	Burned 4-24-1912
468	Burned 4-24-1912
469	Wrecker (Snelling). Burned 4-24-1912
470	Rebuilt to Sand Car 11-29-1905 (seats removed) (Midway); automatic feed device. Burned 6-1912
471	Rebuilt to Sand Car 11-28-1905 (seats removed) (Owen St.); automatic feed device. Burned 4-24-1912
472	Motors removed 11-11-1905. Sold to Boise City Ry. 8-1907
473	Rebuilt to Sand Car 11-25-1905 (seats removed) (East Side); automatic feed device 12-15-1906. Burned 4-12-1912
474	Sold (no electric equipment) to Danville St. Ry. & Lt. Co. (Ill.) 9-29-1905
475	Burned 10-1-1908
476	Sold to Fargo & Moorhead St. Ry. 11-13-1905
479	Sold GSK (letter 9-30-1908), body only to Schuylkill Valley Ry. (Pa.) 10-1-1908
480	Sold to Fargo & Moorhead St. Ry. 11-13-1905
481	Smashed too badly to repair; Scrapped 9-14-1905
482	Burned 9-30-1908
483	Motors removed 11-11-1905. Burned 7-24-1911
485	Burned 9-27-1909
486	Sold to Kankakee Elect. Ry. 4-2-1906
487	Motors SRG 25 #11 winding 9-9-1904 and placed on Bryn Mawr line. Given to

	University of Minnesota, date ??
489	Motors received #11 winding 9-12-1904. Sold to Mr. Holmes of Kansas City-Leavenworth line 8-24-1905
490	Rebuilt to Sand Car 12-1-1905 (seats removed) (East Side); automatic feed device 12-8-1906. Burned 4-24-1912
491	Burned 10-10-1908
492	Roundhouse Switcher as of 9-1-1904. Scrapped 10-8-1907
494	East Side extra Wrecker (no seats). Burned 6-1912
495	Rebuilt to Sand Car 11-22-1905 (seats removed) (Smith Ave.). Burned 4-24-1912
497	Burned 7-24-1911
498	Sold GSK (letter 9-30-1908), body only to Schuylkill Valley Ry. (Pa.) 10-1-1908
499	Sold to Mr. Holmes of Kansas City-Leavenworth line 8-24-1905
500	Burned 7-24-1911
501	Burned 10-1-1908

MSR 503-538, Northern Car Co. 7-30-1891, 18 ft. Closed Motor Cars: 36 cars. All record cards show the date built as 7-30-1891 although we know the cars were received in two groups: 20 cars 503-522 and 16 cars 523-538. Hand brakes, straight front and rear platforms, longitudinal seats, rear exit with single gates.

3 cars disposed of prior to 9-1-1904: 504,506,533.

33 cars remained:

Equipment: "3rd Ave. summer 1904 dismounted" 1511,522,1523,524,1529,1534. All others: one Bemis truck, rheostatic control. Two Sprague motors: 503,507,508,512,514,515,517,519-522, 1523,525-526,528,530,531,537. Two Sprague 15 motors: 1518,1527,1529,1532,1534,1535. Two Sprague 15 motors crossed out 9-8-1904: 1511. Note that 1511,522,1523,1529,1534 are shown as dismounted summer 1904 but also with motors.

Dispositions:

503	Burned 4-24-1912
505	Rebuilt DEV 11-15-1905: one Bemis truck, two SRG motors and two K-11 controllers. No record card, but on list of cars Burned 6-1912.
507	Burned 4-24-1912
508	Burned 6-1912
509	Rebuilt DEV 11-15-1905: one Bemis truck, two SRG motors and two K-11 controllers. No record card but on list of cars Burned 6-1912.
510	Rebuilt DEV 10-26-1905: one Bemis truck, two SRG motors and two K-11 controllers. No record card but on list of cars Burned 6-1912.
1511	Rebuilt DEV 10-18-1905: one Bemis truck, two SRG motors and two K-11 controllers (Owen St.). Burned up at Robbinsdale 10-7-1907
512	Scrapped 11-25-1905
513	Rebuilt DEV 10-26-1905: one Bemis truck, two SRG motors and two K-11 controllers. No record card but on list of cars Burned 6-1912
514	Burned 4-24-1912
515	Burned 7-24-1911
516	Rebuilt DEV 11-6-1905: one Bemis truck, two SRG motors and two K-11 controllers. No record card but on list of cars Burned 6-1912
517	Sold to private party at Stillwater, Minn., 1-20-1910
1518	Burned 7-24-1911
519	Burned 10-5-1908
520	Burned 9-29-1908
521	Burned 4-24-1912
522	Sold GSK (letter 9-30-1908), body only to Schuylkill Valley Ry. (Pa.) 10-1-1908
1523	Rebuilt DEV 10-28-1905 (varnish 11-20-1905): one Bemis truck, two SRG motors and two K-11 controllers. Burned 6-29-1911

524	Rebuilt DEV 11-6-1905 (11-11-1905?): one Bemis truck, 2 SRG motors and 2 K-11 controllers (Smith Ave.). Burned 4-24-1912
525	Burned 7-12-1910
526	Sold to Mankato Electric Traction Co. 1-13-1911
1527	No disposition listed on the record card. ON LIST OF CARS BURNED 7-24-1911
528	Burned 7-24-1911
1529	Rebuilt DEV 10-28-1905: one Bemis truck, two SRG motors and two K-11 controllers (Smith Ave.). Renumbered 529 3-20-1912 to avoid conflict with new car construction. Burned 6-1912
530	Burned 6-1912
531	Burned 10-1-1908
1532	Burned 10-1-1908
1534	Rebuilt DEV 11-11-1905 (10-30-1905?): one Bemis truck, two SRG motors and two K-11 controllers. Burned 4-12-1912
1535	Burned 9-27-1909
536	Rebuilt DEV 10-20-1905: one Bemis truck, two SRG motors and two K-11 controllers. No record card but on list of cars Burned 7-24-1911
537	Burned 7-24-1911
538	Rebuilt DEV 10-20-1905: one Bemis truck two SRG motors and two K-11 controllers. No record card but on list of cars Burned 7-24-1911

AVERY® PV119ED

SPCR 503-527,529-539 John Stephenson Co. 5-1891, 18 ft. Closed Motor Cars: 36 cars. Hand brakes, longitudinal seats, rear exit with single gates. These cars had the "bombay" roof favored by the Stephenson Co. The record cards all indicate a date built of 5-1891; since 528 was a company-rebuilt (spliced) 22 ft. single-truck closed motor car, this order apparently was shipped in two groups, one of 25 cars and one of 11 cars, similar to the Northern Car Co. order of two groups (20 cars and 16 cars).

27 cars were disposed of prior to 9-1-1904: 503,504,506,507,509,510,512,514,515,517,519-526, and 529-537.

9 cars remained.

Equipment:

"3rd Ave. summer 1904 dismounted" 1513,518,1539.

One Bemis truck, 2 Sprague motors, rheostatic control: 1505,1508,511,1516,527,1538.

Dispositions:

1505	Scrapped 11-1-1906
1508	Burned 6-1912
511	Burned 7-24-1911
1513	Sold GSK (letter 9-30-1908), body only to Schuylkill Valley Ry. (Pa.) 10-1-1908
1516	Burned 7-24-1911
518	Sold to Marshalltown Light, Power & Ry. Co. 4-2-1908
527	??? 10-17-1906
1538	Hit by Soo Line R.R. engine at 36th and Central Ave's. N.E. on Columbia Heights Extension 12-18-1904
1539	Sold GSK (letter 9-30-1908), body only to Schuylkill Valley Ry. (Pa.) 10-1-1908

SPCR 528,541-569, 22 ft. Closed Motor Cars, rebuilt from Horsecars originally built by John Stephenson Co. and Brownell & Wight: 30 cars.

528: a Feb 1892 periodical reported that 528 had been rebuilt by Northern Car Co. to 22 ft. length by joining two Stephenson-built Horsecars. Disposed of prior to 9-1-1904

541-569: converted Horsecars rebuilt June 1892 to 22 ft. length, presumably by Northern Car and re-numbered.

26 cars disposed of prior to 9-1-1904: 541-566 (one car was 1546)

3 cars remained: 567-569, original builder Brownell & Wight, rebuilt 6-1892. Length 18 ft. (sic), hand brakes, longitudinal seats, rear exit with single gates. All had one Bemis truck, two Sprague motors and rheostatic control. All three were in the Snelling Car Storage, in good condition, at 4-1-1910.

Disposition: all three were sold to the International Transit Company, Sault Ste. Marie, Michigan, 11-2-1910

SPCR 540 Northern Car Company 1892, 35 ft. vestibuled, double-truck, closed Motor Car. This was the "test car" built for the Northwest Thomson-Houston Company. McGuire #20 trucks and two Thomson-Houston W.P. 50 motors. Photographed in service during 1898 at E. 7th St. and Newcombe St. connecting with a St.Paul & White Bear Railroad passenger motor car. ~~This car may be the "whaleback" reported used for servicing the company resort and amusement facilities~~. S.W.O. April 1903: change old Washburn Park car for temporary Storehouse use. Rebuilt to Supply Car 2 5-8-1903. S.W.O. November 1904: change trucks from car 874 to Supply Car 2. The record card lists the equipment as two Bemis [29] trucks, four Thomson-Houston W.P. 50 motors, and one K-6 controller. On 4-19-1912 it was refitted with Brill 27-A2 trucks, air brakes, electric heaters and a sliding door to the motorman's cab. As of 1-1-1920 it had Brill trucks, 4 G.E. 67 motors and K-6 controller. It was replaced by Supply Car 2nd 2 in November 1922 and placed in the Snelling Car Storage Shed. It was destroyed in the Snelling Car Storage Shed fire 8-17-1925.

MSR 539-554 Northern Car Company 4-15-1892, 36 ft. 12-bench Open, double-truck, Motor Cars: 16 cars. Hand brakes, cross seats, center aisle, footboards: on "gate side" for certain, if originally on the "pole side" they had been removed by June 1894. After 1896 modifications: footboards removed, side screen guards added, rear bench removed for installation of rear exit with single gates and folding step.

The Northern Car Co. plant was destroyed by fire 5-7-1892 along with "a number of unfinished cars for St.Paul". Apparently this included three cars, 552-554. Car 548 was either sold to given to the Highland Improvement Company, Duluth in 6-1892. Car 539 was either sold or given to the Milwaukee St. Ry. also in 1892.

This left **11** cars as of the Frank Trumbull 1-18-1893 Inspection Report: **540-547,549-551**. As of 1901 these cars were shown on company drawings as 37'0" long, 7'10½" wide, weight 25,800 pounds, with two Bemis M.T. trucks, two Thomson-Houston W.P. 50 motors (both on the front truck), and TCRT rheostat controller. By 1904 on all cars a three-window front dash had been installed along with a K-11 controller; width was now listed as 7'8". The 1904 record cards show: 36 ft. long, cross seats, rear exit, single gates, Bemis double trucks (33" cast wheels), 2 W.P. 50 motors, and K-11 controller. Air brakes were installed 7-1-1908 with one 8" brake cylinder. All cars were repainted in May 1898 and 7-1-1908. All were Burned 3-1913.

MSR 555-568, 36 ft. Open, double-truck, Motor Cars: 14 cars. These were ex "Motor Line" (Minneapolis, Lyndale & Lake Minnetonka Ry.) Open Trailers that were to be rebuilt to electric motor cars by Northern Car Company. 557 was reported to be ex ML&M Ry. 65. Apparently all were completed before the Northern Car Co. plant was destroyed by fire in May 1892. All were included in the Frank Trumbull 1-18-1893 Inspection Report. It appears that all 14 cars had been disposed of by the time of the 1902 U.S. Census.

MSR 607-626 American Car Co. 7-9-1892, 41 ft. vestibule Closed Motor Cars: 20 cars. Refer to page 10 for information on the cars as received from the builder. Refer to page 22 on the installation of folding wire-mesh gates.

When the front exit steps and gates were removed in 1894 the front platform was rebuilt for exclusive use of the motorman, an exterior hinged swing-door was installed. Presumably the interior cab swing-door was removed, the front bulkhead sliding door being retained, but the conductor's controls removed. My early notes list the installation of a TCRT #1 rear step, but several years later when a classification number system was developed it was designated as a #3 step.

As of September 1899 the cars were still equipped mechanically and electrically as originally built: Bemis M.T. trucks, two Thomson-Houston W.P. 50 motors, TCRT rheostat controller; weight 31,000 pounds. In 1900 it was decided to rebuild these cars to conform as nearly as possible with TCRT's standard car design then being built. This involved installing double-sash body side and rear platform windows, changing seats to seven rows of cross seats at the front with longitudinal benches toward the rear, and upgrading the mechanical and electrical equipment.
Work Order descriptions also provide some information. (The month is when the expenditures were first incurred.)

Jan 1901	Overhaul Interurban cars; wire and mount Interurban cars for three and four motors.
Sep 1901	Overhaul and revarnish 21 [sic] Interurban cars.
Mar 1902	Rewire 19 American cars from two to four circuits.

A tracing dated March 1901 indicated that ten cars had been completed: 610-612,614,616,619,621,622,624,625.
Another tracing dated 5-13-1901 included:

American Vestibuled Old	42'6" long, 8'9" wide, weight 41,700 lbs.
American Vestibuled Rebuilt 1901	42'6" long, 8'9"wide, weight 41,500 lbs.

Equipment consisted of Brill 27-A1 trucks, four Thomson-Houston W.P. 50 motors (gear ratio 17:64), K-6 controller, G.E. Co. #6 trolley base (4" trolley wheel), and hand brakes. Completion date(s) on the other cars have not been found,.

More information from Work Orders:

Aug 1902	Repair and repaint two American cars 618 and 623.
Nov 1902	Equip 618 and 623 with G.E. 57 motors geared equal to the same motors on cars 868-899.
Jul 1904	Standardize 19 [sets] of old Brill trucks and W.P. motors.

During 1902-1903 the cars were equipped with Christensen air brakes (one 8" brake cylinder) and whistles.

The equipment data sheet prepared after all these changes had been completed included the following. Length overall 42'6", length of body 32'6", length of platforms 5'0" each. Width 8'9". Truck centers 21'5", truck wheelbase 5'8". Height over trolley board 11'9". Weight 43,000 lbs. Seats + and =. Rear door: single. Brill 1900 [sic] trucks with 33" wheels.

The mechanical dept. record cards indicate they were repainted twice after the 1901 overhauling.
1. 617 in Feb 1905, 616 in Sep 1905, and 608-615,618-626 during Jan-Feb 1906.
2. June and July 1911.

The cars were originally assigned to Midway Station, St. Paul, for operation on the "Interurban" line. They were replaced on that line during 1902 by newly-built cars of the 900-949 series. As of 11-16-1909 all were assigned to East Side Station, Minneapolis. All were removed from service 6-23-1910 and placed in storage at the 31st St. Roundhouse, Minneapolis. They were returned to service in the fall of 1910 at East Side Station. All were transferred to the newly completed Lake Street Station, Minneapolis, 11-5-1910, where they were operated on the "Minnehaha Falls" local line and both"8th Ave. So." lines. All were removed from service 6-25-1914 and placed in the Snelling Shops Storage Shed, St. Paul. An advertisement for their sale was placed in the Electric Railway Journal.

Dispositions: the cash receipts journal entries indicate some differences compared to the mech. dept. record cards. I am relying on the cash receipts entries and noting the differences.

1901-1902	Wrecked: 607. (I believe it was hit by a train at the railroad crossing on Washington Ave. S.E., Minneapolis.) Based on the S.W.O. dates, this occurred between September 1901 and March 1902.
6-10-1914	Repainted and sold to the Kansas City, Kaw Valley & Western R.R.: 611,614,615,617.
7-??-1914	Sold to A. B. Saunders Company: 613,620. (The record cards indicate they were sold in 1917 to the Kansas City, Merriam & Shawnee Railway [which became the Kansas City, Lawrence & Topeka Railway]).
10-?-1914	Sold to Kanawha Traction & Electric Co., Parkersburg, W. Va.: 608,609,618,619.
1915	Sold to the Charles City Western Ry., Charles City, Iowa: 621. (Became their 52. It was subsequently used in work service and scrapped in 1957.)
12-?-1916	Body only sold to Kansas City, Lawrence & Topeka Ry.: 616. (The record card indicates it was sold in 1917 along with 613 and 620 to the Kansas City, Merriam & Shawnee Ry.)
Jan-Apr 1917	Bodies only sold to the Kansas City, Lawrence & Topeka Ry.: 610,622,623. (The record cards indicate they were sold in 1916 to the Kansas City Western Ry. The KC&W Ry. as of Jan 1900 was the Kansas City-Leavenworth Ry. which may be the line which bought some of the original single-truck cars. In 1905 it became the KCW Ry. owned by the Fisk-Robinson group. As a result of a 1920 bankruptcy it became the Kansas City, Leavenworth & Western Ry.)
8-17-1925	Destroyed in the Snelling Shops Storage Shed fire: 612,624-626.

607-626
Built under American Car Company Order Number 19

Disposition Information

The four cars sold to the Kansas City, Kaw Valley & Western Ry. in June 1914 (611,614,615,617) were renumbered 01-04. They were used to open the line for passenger service in 1914 until the new cars on order arrived. (Four in 1914, two in 1916 and two in 1917.)

The two cars sold to the A. B. Saunders Company inJuly 1914 (613,620) did NOT go to the Kansas City, Lawrence & Topeka Electric Railroad. The record cards are in error.

Four carbodies only were sold to the Kansas City, Lawrence & Topeka Electric Railroad (610,616,621,623) from December 1916 thru April 1917.

The record cards are in error as to the name of the company being Kansas City-Western Railway. This was a different company and a different line. Originally the Kansas City-Leavenworth Railway its name was changed 11-1-1905 to the Kansas City-Western Railway. It later became the Kansas City, Leavenworth & Western Railway.

The KCL&TE RR had five original double-truck closed cars, 100-104, built by St.Louis Car Comnpany. The four TCRT carbodies replaced these five cars. Their St.Louis 47 trucks with motors were transferred to the TCRT carbodies. This line ceased operation 7-31-1927 at which time some or all of these TCRT cars were still in service. (Photograph of #104.) Partial operation, Kansas City to Rosedale, was resumed 5-12-1928 under the name of Kansas City, Merriam & Shawnee Electric Railway using four cars rented from the Kansas City Public Service Company. Abandoned 4-1-1934.

MSR 627-706 American Car Co. 1-19-1893, 27 ft. 8-bench Open Motor Cars: 80 cars. Order # 36
Cross seats, center aisle, footboards "gate side" only. After modifications: footboards removed, side screen guards added, rear exit with single gates. Car 687 was listed as "exits rear double end".
folding step

15 cars had been diposed of prior to 9-1-1904: 692-706. There were no mech. dept. record cards on these cars, indicating they were probably destroyed in one of the two major carhouse fires.

65 cars remained.

Equipment:

"Rice St. 12-26-1903 dismounted": 640,672,686,689-691.

One Bemis truck, two SRG motors, rheostatic control: 627,628,631,633,646,651,655,657,658,661,666,673,674,678-680,683.

One Bemis truck, two Sprague motors, rheostatic control: 629,630,632,634-639,641-645,647-650,652-654,656,659,660,662-665,667-671,675-677,681,682,684,685,687,688.

Dispositions:

627	Burned 11-20-1908
628	Scrapped 9-1-1906
629	Sold to A. S. Partridge 4-19-1909. (Arthur S. Partridge Co., St.Louis, was a street railway parts distributor or contractor.)
630	Burned 11-20-1908
631	Burned 11-17-1908
632	Burned 8-2-1911
633	Burned 11-20-1908
634	Sold to A. S. Partridge 5-10-1908
635	Sold to A. S. Partridge 3-23-1908
636	Sold to A. S. Partridge 3-23-1908
637	Burned 9-28-1909
638	Sold to Fargo & Moorhead St. Ry. 9-17-1906
639	Sold to Fargo & Moorhead St. Ry. 9-17-1906
640	Body Sold to Wausau St. Ry. 5-25-1907
641	Burned 7-24-1911
642	Burned 11-17-1908
643	Burned 11-20-1908
644	Burned 6-1912
645	Sold to A. S. Partridge 4-15-1909
646	Burned 11-20-1908
647	Sold to R. L. Costigan 8-1907
648	Burned 8-2-1911
649	Burned 11-17-1908
650	Burned 11-20-1908
651	Sold to Fargo & Moorhead St. Ry. 9-17-1906
652	Burned 9-1-1909
653	Sold to A. S. Partridge 4-15-1909
654	Burned 11-17-1908
655	Burned 7-24-1911
656	Burned 11-17-1908
657	Burned 6-1912
658	Burned 9-28-1909
659	Sold to R. L. Costigan 8-1907
660	Burned 8-2-1911
661	Burned 11-20-1908
662	Burned 11-17-1908
663	Sold to A. S. Partridge 3-23-1908
664	Burned 11-20-1908
665	Sold to A. S. Partridge 4-3-1909
666	Sold to A. S. Partridge 3-23-1908

667	Burned 11-20-1908
668	Burned 11-17-1908
669	Burned 11-17-1908
670	Sold to A. S. Partridge 3-23-1908
671	Burned 8-2-1911
672	Burned 6-1912
673	Burned 11-17-1908
674	Burned 6-19-1909
675	Sold to Fargo & Moorhead St. Ry. 9-17-1906
676	Burned 11-20-1908
677	Sold to A. S. Partridge 3-23-1908
678	Burned 11-17-1908
679	Burned 8-2-1911
680	Burned 11-20-1908
681	Burned 11-17-1908
682	Burned 11-17-1908
683	Burned 11-20-1908
684	Sold to R. L. Costigan 8-1907
685	Burned 6-1912
686	Body Sold to Wausau St. Ry. 5-25-1907
687	Sold to Fargo & Moorhead St. Ry. 11-13-1905
688	Sold to Fargo & Moorhead St. Ry. 11-13-1905
689	Body Sold to J. B. Watson/Wausau St. Ry. 6-15-1906. (John B. Watson, Phila.) used railway equipment and parts.)
690	Body Sold to J. B. Watson/Wausau St. Ry. 6-15-1906
691	Burned 6-1912

SPCR 570-634, LaClede Car Co. 1-19-1893, 28 ft. 8-bench Open Motor Cars: 65 cars
Cross seats, center aisle, footboards "gate side" only. After modifications: footboards removed, side screen guards added, rear exit with single gates; folding step. Renumbered 1570-1634. Cars 1595,1605,1616,1620 listed as "exits rear double end".

12 cars disposed of prior to 9-1-1904: 1594,1596,1603,1609,1612,1614,1618,1619,1621,1623,1625, 1628.

53 cars remained.

Equipment:

"Rice St. 12-26-1903 dismounted: 1571,1572,1578,1579,1581,1582,1598,1610,1611,1613,1626, 1630.

The other 41 cars had one Bemis truck, two Sprague motors, and rheostatic control.

Dispostions:

1570	Burned 11-17-1908
1571	Sold to R. L. Costigan 8-1-1906
1572	Burned 6-1912
1573	Sold to J. B. Watson, Phila., 6-23-1906
1574	Burned 11-20-1908
1575	Sold to J. B. Watson, Phila., 6-23-1906
1576	None listed on card. Sold to J. B. Watson, Phila., 6-15-1906
1577	Sold to R. L. Costigan 8-1907
1578	Burned 6-1912
1579	Sold to R. L. Costigan 8-1-1906
1580	Burned 6-19-1909
1581	Burned 6-1912
1582	Sold to R. L. Costigan 8-1-1906
1583	Sold to J. B. Watson, Phila., 6-23-1906 Also appears on a list of cars to be burned 7-24-1911

1584	Burned 8-2-1911
1585	Burned 8-2-1911
1586	Burned 8-2-1911
1587	Sold to J. B. Watson, Phila., 6-23-1906
1588	Burned 11-17-1908
1589	Burned 7-24-1911
1590	Sold to Boise City Ry. 3-31-1906
1591	Sold to Fargo & Moorhead St. Ry. 6-13-1906
1592	Sold to Fargo & Moorhead St. Ry. 6-13-1906
1593	Burned 11-17-1908
1595	Burned 7-24-1911
1597	Burned 11-17-1908
1598	Burned 6-1912
1599	Burned 11-17-1908
1600	Burned 11-20-1908
1601	Sold to Aberdeen St. R.R. (S.D.) 5-1-1911
1602	Sold to Devils Lake & Chautauqua Transfer Co. 9-17-1906
1604	Burned 6-19-1909
1605	Sold to R. L. Costigan [8-1-1906?]
1606	Burned 8-2-1911
1607	Sold to Devils Lake & Chautauqua Transfer Co. 9-17-1906
1608	Burned 11-17-1908
1610	Sold to Grand Forks Transit Co. 6-15-1909
1611	Sold to R. L. Costigan 8-1-1906
1613	Sold to Grand Forks Transit Co. 6-15-1909
1615	Burned 11-17-1908
1616	Burned 9-1-1909
1617	Burned 9-28-1909
1620	Sold to Nebraska 8-20-1906
1622	Burned 11-17-1908
1624	Sold to J. B. Watson, Phila., 6-23-1906
1626	Sold to Grand Forks Transit Co. 6-15-1909
1627	Burned 11-17-1908
1629	Sold to Fargo & Moorhead St. Ry. 6-13-1906
1630	Sold to Grand Forks Transit Co. 6-15-1909
1631	Sold to Aberdeen St. R.R. (S.D.) 5-1-1911
1632	Burned 11-17-1908
1633	Burned 11-17-1908
1634	Burned 11-17-1908

MSR 707-731 American Car Co. 1-6-1893, 40 ft. 13-bench Open Motor Cars: 25 cars. Order # 35 Cross seats, center aisle, footboards "gate side" only? After modifications: footboards removed, side screen-guards added, rear bench removed for installation of rear exit with single gates and folding step. As of 1901 they were 41'7" long, 8'3" wide, weighed 26,500 pounds, and were equipped with two Bemis M.T. trucks, two Thomson-Houston W.P. 50 motors (both on the rear truck), and TCRT rheostat controller. By 1904 a three-window front dash had been installed along with a K-11 controller. Weight 25,950 pounds. Air brakes (G.E. Co.) with one 8" brake cylinder were (713 in 1907) installed 6-1-1908; weight was now 27,750 pounds.

Disposition: all were Burned 3-1913.

MSR 732-735 "Windsplitters": 4 cars. Refer to page 23 for a complete description as built. As of 9-1-1904 there were mech. dept. records only on 732-734. 735 appears on a list of cars to be burned 7-24-1911. The Construction Journals indicate that four cars, 732-735, were sold to the North Side St. Ry., Robbinsdale, in May 1906 for $1,250 each. However this entry was reversed in October 1906 as TCRT had acquired the North Side St. Ry. The record cards listed each with wood underframe, straight platforms, rear exit with single gates, Baker heater, longitudinal seats, hand brakes, two Bemis trucks, two G.E. 57 motors, and K-11 controller.

732 and 734 had the two G.E. 57 motors removed and replaced with two G.E. W.P. 50 motors: 732 on 4-6-1905 and 734 on 4-4-1905. Both were reported stored at Smith Ave. Carhouse as of 4-1-1910, in fair condition but interior stripped.

733 was rebuilt 12-22-1906 for use on the "South Stillwater" line. Longitudinal seats; 8" drop ~~front and~~ rear platform, exit rear with double gates; G.E. air brakes with one 10" cylinder; Bemis double trucks with 33" standard wheels but special axles; four G.E. 70 motors and one K-28 controller.

Disposition: all four cars were Burned 7-24-1911.

789-796 "North St.Paul Pups": refer to page 24 for information when acquired with purchase of the St.Paul & Suburban Railway (formerly St.Paul & White Bear Railroad) in June 1898. Apparently they were renumbered into the TCRT number series in September 1899 before new car 797 was completed. They front vestibules were rebuilt and the open rear platforms fitted with folding wire gates on the "gate side" steps and stationary wire screen-guards, no steps, on the "pole side". All cars had straight platforms.They were re-equipped, probably around 1901, with Bemis #29 (C.B.) trucks, two Thomson-Houston SRG or Sprague motors, rheostatic control, and hand brakes. These cars originally served on Minneapolis local lines operated from East Side Station. The 9-1-1904 mech. dept. record cards indicate that many changes had been made and were subsequently made.

789 No seats, rear exit with single gates, no heater. 5-1-1906 made into a Baggage Car for the Lake Minnetonka line (repainted 4-28-1906): Bemis trucks, 4 W.P. 50 motors, K-6 controller. Used as a Switch Car from 1909 when replaced by Baggage Car 34; re-numbered 41 in 1911. Scrapped 2-13-1916.

790 = seats, rear exit with single gates, no heater, two SRG 25 motors with K-6 controller. Rebuilt 10-28-1905 into Electric Dept. Supply Car (repainted 10-28-1905) with Bemis C.B. trucks, 4 SRG motors and K-6 controller. Scrapped 6-1912.

791 No information other than had two W.P. 50 motors, now removed. Dismounted body ~~Harriet Siding~~/Midway Siding. Scrapped 6-29-1905.

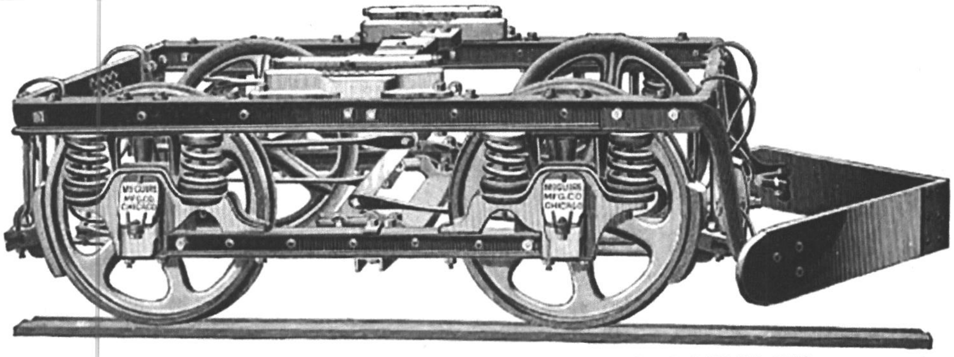
792 = seats, rear exit with single gates; had two W.P. 50 motors, now removed. Dismounted body at ~~Harriet Siding~~/Midway Siding. Scrapped 6-29-1905.

793 No seats, rear exit with no gates, no heater, two SRG motors. Rebuilt to Supply Car 6-1-1904. Repaired 5-26-1906 (varnished). Scrapped 9-29-1909.

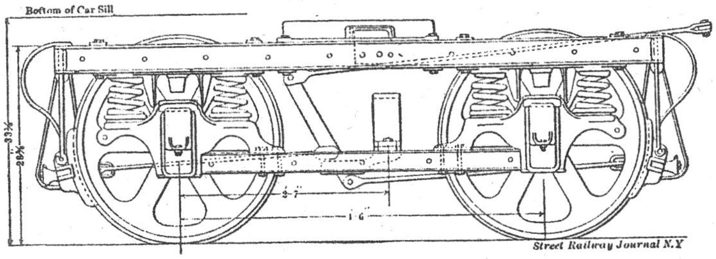
794 No seats, front and rear exits, single gates, two SRG 25 motors. At Harriet Siding. Rebuilt into Work Car (Shop Flat) 6-30-1905: W.P. 50 motors, K-6 controller. Renumbered 42 in 1911. There exists a panoramic photograph of an area of the Snelling Shops yard in which what must be this car can be seen; the rear bulkhead, roof over the rear platform, and rear dash all have been removed. Apparently used to load bulky materials or equipment from the rear. Scrapped 1914.

795 = seats, front and rear exits, single gates, stove heater, two Sprague 15 motors. At ~~Midway~~/Harriet siding. 9-7-1904 came into the shop to be repaired for sale /loan to St.Louis Park line: new headlights, stove and upholstering; register and rheostat put in good shape. Delivered 9-10-1904. Returned 10-1-1904. Harriet siding. Scrapped 6-29-1905.

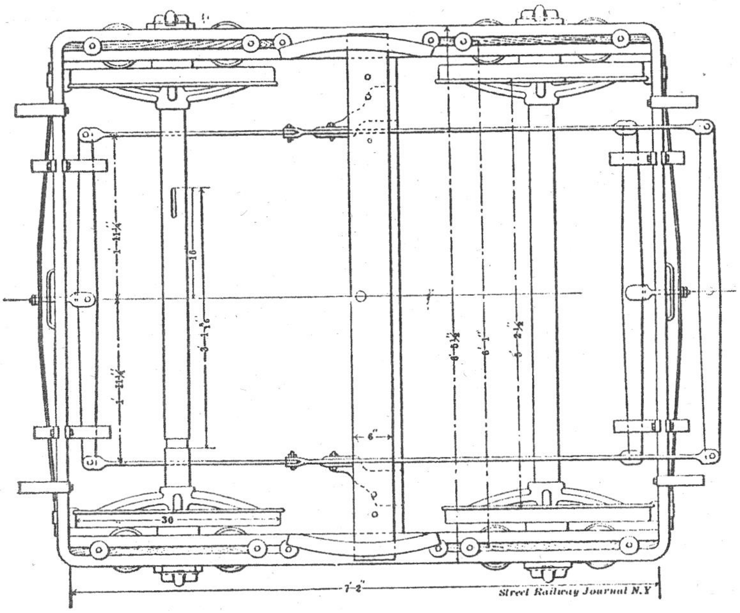
796 No seats, rear exit, exit door, stove heater, two SRG 25 motors. March-April 1904: equipped as a Rail Bond Test Car: K-11 special controller, weight 27,300 lbs. Scrapped 4-24-1912.


McGUIRE MFG.CO. CHICAGO
McGUIRE MFG.CO. CHICAGO

SRJ LATE 1890 FIG. 1—McGUIRE MANUFACTURING CO.'S TRUCK FOR DOUBLE TRUCK CARS.


Bottom of Car Sill
33½
28¾

Street Railway Journal N.Y



Street Railway Journal N.Y

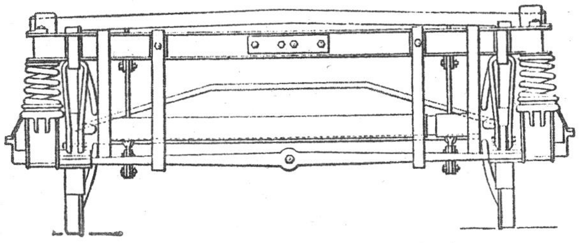


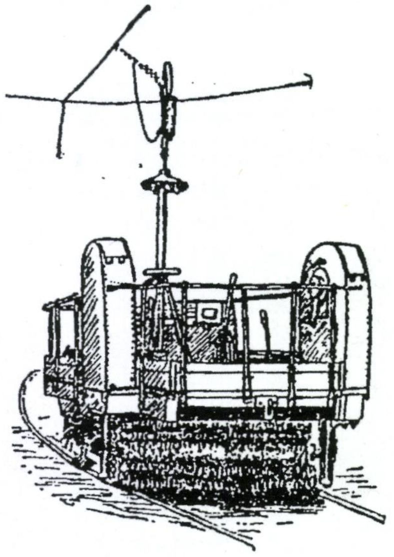
FIG. 454.—McGUIRE TRUCK FOR EIGHT WHEEL CARS.

SERVICE EQUIPMENT

The Snow Plows, Snow Sweepers, Scrapers, and Salt Cars in the Trumbull 1-18-1893 Report were mostly horse-drawn from the horsecar operations. Some of the Salt Cars were converted Horsecars. All of these could be pulled or pushed by motor cars. One electric Snow Plow was mentioned January 1890 as available in Minneapolis; the sketch in the newspaper article was taken from the following Street Railway Journal article. An electric Snow Sweeper was built in St.Paul during January 1891 described elsewhere in these pages.

Mpls. Tribune 1-24-1890

Snow storm. The track on the 4th Ave. S. electric line was cleared by hitching a snow plow to the rear of a motor car; easily hauled over the line. The electric motor snow plow was not necessary.

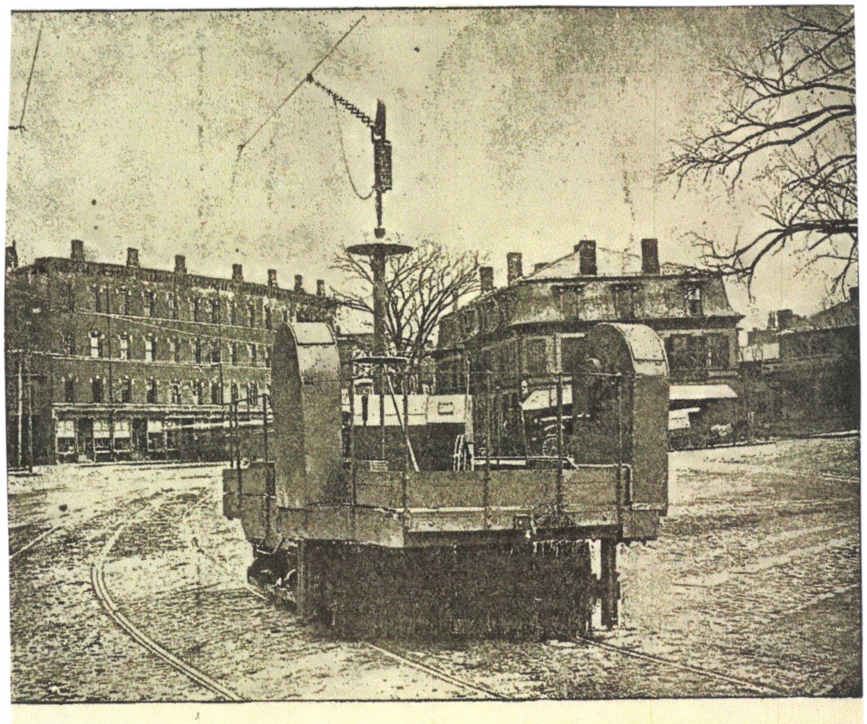


THE SNOW SWEEPER.

Snow Broom for Use on Electric Railways.

Anticipating the usual New England winter, the Thomson-Houston company designed a snow broom (shown in the accompanying cut) for use on the Cambridge Division of the West End Street Railway. The truck, which is of the Brill type, (J. G. Brill Company, Philadelphia, Pa.) and has a five foot wheel base, is equipped with a 30 h. p. motor geared to drive the truck at a speed of 12 miles per hour. The snow broom is 30 in. in diameter and set at an angle of 45 degrees. It is driven by a stationary motor of 20 h. p. at a speed of 100 revolutions per minute. Only two men are required to operate the broom, the brake and controlling mechanism being placed in such a position as to render it an easy matter. The broom was used for the first time during the snow storm which visited Boston Sunday, March 31, and worked admirably, and it was also tested by placing bricks and boards in front of it, and the way these were brushed aside to a distance of four or five feet from the track, leaves no doubt of the ability of this appliance to cope successfully with heavy storms. The company has also built a much larger machine, with 36 inch wheels and fitted with two brooms and a scraper, which will be able to deal with the severest storms.

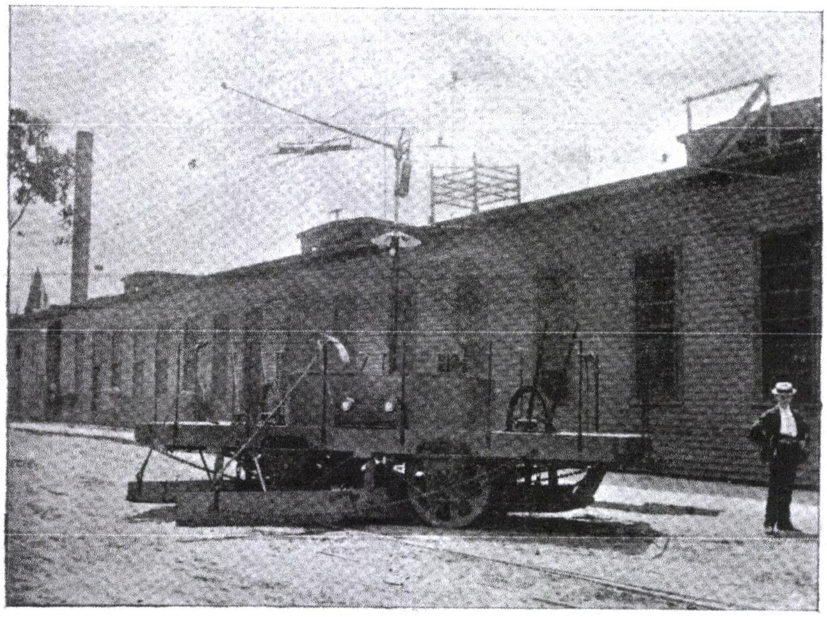
SRG APR 1889



SNOW BROOM FOR USE ON ELECTRIC RAILWAYS. SRG APR 1889

New Thomson-Houston Snow Plow and Snow Sweeper.

Experience in operating electric railways in winter has demonstrated the fact that some appliance is needed for keeping the tracks as free from snow as possible. That the Thomson-Houston Electric company fully realized this is shown by its action in devising the snow plow and snow sweeper shown in the accompanying illustrations. Last winter's experience showed just what was needed in this direction, and in the new appliances will be found many improvements over the old types. The dimensions of the snow plow are: Length over all, 20 feet; width, 7 feet; height from rail to floor of car, 3 feet 6 inches. The truck has four 36-inch wheels, in front of which is placed a digger which scrapes the snow from the track, thereby securing a good contact for the wheels. These diggers or scrapers, are controlled by levers placed at each end of the car, and may be raised and lowered at will. One of the main plows is placed diagonally across the car, one end being in front of the forward wheel on one side, the other end coming out between the front and rear wheels on the opposite side, at an angle of about 60 degrees. By placing the plow in this manner a position is secured where the least oscillation occurs. Although the plows extend two feet beyond the wheels, each is provided with an extension, by means of which a path of any desired width, depending upon local conditions, can be made. The second main plow is hung parallel to, and in the same manner as the first, each, however, being independent and controlled by levers placed upon the car platform. One or both can be used as the circumstances require. The plows are kept at a proper angle by means of chains and iron rods, so arranged as to permit great freedom of movement in a vertical direction.

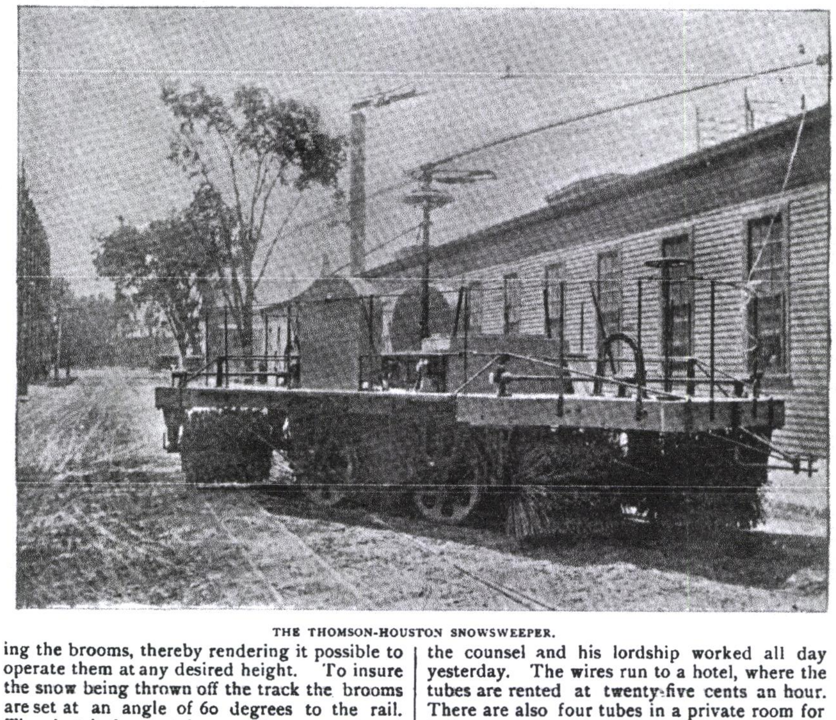


THE THOMSON-HOUSTON SNOWPLOW.

The car is propelled by two 20-horse power motors, of the consequent pole type, one being geared to each axle by means of sprocket chains and chain gear wheels, and are capable of propelling a car at a speed of ten miles an hour. The sprocket chains run as slow as possible since the total reduction in speed is made by gears on the motor frames. They are inclosed in iron boxes. In circuit with the motors is placed a reversing switch and rheostat, also placed in a closed iron box. The trolley arm is supported by a post placed in the center of the car platform, and which is also used as a support for a number of incandescent lamps. The car can be operated in either direction.

The car for the snow sweeper is of the same dimensions as that used for the plow, the wheels being 36 inches in diameter, and mounted on a 3½ inch axle. The motors for driving the car are of 15-horse power each, and are entirely independent of the motors used for driving the brushes, being provided with separate reversing switch and rheostat, inclosed in an iron box, and placed on the platform within easy reach of the operator. The motors for operating the brushes are placed on the car platform, with a shaft parallel to that of the broom, and connected to it by means of sprocket chains so as to run at a speed of 200 revolutions per minute. The brushes, which are placed in advance of the truck are two in number, and are made in sections to facilitate removal or changes of any kind.

On the platform of the car on both sides are handles operating clutches by means of which the broom can be thrown in or out of operation. Levers are also provided for raising and lowering the brooms, thereby rendering it possible to operate them at any desired height. To insure the snow being thrown off the track the brooms are set at an angle of 60 degrees to the rail. The electrical connections are the same as found on the passenger cars, the motors for propulsion being connected in multiple, but independently of the motors used for driving the brushes. The current is taken from the overhead conductor by means of a trolley, supported on a post eight feet high placed in the center of the car. Around this post are grouped incandescent lamps which are employed when the car is required for night service. Both the snow plow and sweeper are made for severe work and tests to which they have been submitted indicated that they will meet the requirements for which they were devised.



THE THOMSON-HOUSTON SNOWSWEEPER.

Novel Use of the Telephone.

The most unique use to which the telephone has been adapted is reported from Woodstock, Ont., where the sensational murder trial of Reginald Birchall is in progress. It appears that the courtroom in which the trial is being held is very small and can scarcely accommodate the court attendants, attorneys, reporters and witnesses. The trial naturally excited much interest, and the people from every town in the section gathered to listen to the testimony. They found it impossible to secure admission to the courtroom, but they were afforded an opportunity of listening to the testimony communicated by telephone to "the public house," where twenty receivers were in use throughout the session. A dispatch says: "For several days preparations have been made for this great trial and to-day the scene resembled in a way a great political convention. Several wires of the Great Northwestern Telegraph company had been run into the building and a number of operators were seated in front of their instruments at a table in the rear of the court. At the reporters' table were representatives of several London newspapers and correspondents of leading journals in the Dominion and the United States. On the wall over the judge's head was the large receiver of a telephone. It had been placed there by an enterprising public house keeper and was connected with twenty instruments at his place of business. He knew the court-room could accommodate only a few of those who were anxious to listen to the testimony, and so his house caught the overflow, and all day long men took turns listening to what came over the wires."

The interest in the trial increased as it progressed. A telegram from Woodstock on the third day of the trial announced that the telephone transmitters that hang over the heads of the counsel and his lordship worked all day yesterday. The wires run to a hotel, where the tubes are rented at twenty-five cents an hour. There are also four tubes in a private room for ladies. All of them were busy all day yesterday, and every word that was said in court leaked into the ears of the listeners in the hotel.

Digitized by Google

SERVICE EQUIPMENT

The 1902 U.S. Census reported 19 Work Cars, 1 Snow Sweeper, and 20 Snow Plows. The mech. dept. record cards as of September 1, 1904, account for 13 Work Cars, 1 Snow Sweeper, 20 Snow Plows and 9 Flat Trailers. The 13 Work Cars comprised one Supply Car, one Oil Car, two Wire Cars, three Wreckers, and six Work Flats. (There was one additional Supply Car for which there was no record card.) Apparently almost all of the service equipment listed in Frank Trumbull's 1-18-1893 Inspection Report had been retired and replaced. Our discussion is necessarily confined to those cars for which mech. dept. record cards are available plus Supply Car 1.

It should be noted that each class of service equipment had its own number series, each beginning with number 1.

Two Supply Cars

1: built in December 1891 in the 3rd Ave. N. Shops. Refer to page 9 for information. There was no mech. dept. record card for this car. It was destroyed in the Snelling Shops Storage Shed fire 8-17-1925.

2: ex-540, the Northern Car Co. 1892-built "test car". Refer to pages 9, 12 and 38 for more information. The car was 33'11" long overall, 28' 2 3/4" long between bulkheads, and 8'0" wide. It had Bemis trucks, 4 W.P. 50 motors, K-6 controller, and a National (Christensen) AA-1 air compressor. The car was destroyed in the Snelling Shops Storage Shed fire 8-17-1925.

One Snow Sweeper

1: built by McGuire-Cummings Mfg. Co., date not listed. 28'3" long, 7'2" wide. One McGuire truck (33" wheels), two Thomson-Houston W.P. 50 traction motors, and one SRG broom motor. Assigned to Smith Ave. carhouse. Burned 6-1912.

One Oil Car

1: built by TCRT, date not listed. 22'6" long. One Bemis truck, two Thomson-Houston W.P. 50 motors, and hand brakes. Burned 11-30-1912.

Two Wire Cars

1: built by TCRT, date not listed. One Bemis truck, two Sprague motors, rheostat control and hand brakes. Assigned to East Side Station. Destroyed by fire 5-8-1910; boys playing in the car turned on the controller and left it on with the car's brakes being set.

2: built by TCRT, date not listed. One Bemis truck, two Sprague motors, rheostat control and hand brakes. Received two SRG motors 3-1-1909. Assigned to Owen St. Station, Stillwater. Burned 4-24-1912.

Three Wreckers

1: built by TCRT, date not listed. 20'4" long. One Bemis truck, two SRG motors, rheostat control. K-11 controller installed 4-17-1905. Assigned to East Side Station. Burned 4-24-1912.

2: built by TCRT, date not listed. 20'4" long. One Bemis truck, two SRG motors, rheostat control. K-11 controller installed later. Assigned to Midway Carhouse; re-assigned 1-21-1907 to Smith Ave. carhouse. Burned 4-24-1912.

3: built by TCRT, date not listed. 20'4" long. One Bemis truck, two Sprague motors. Assigned to

AVERY® PV119ED

Smith Ave. Carhouse. Burned 6-1912.

In addition single-truck passenger motor cars were also converted for use as Wreckers. The record cards do not provide dates: MSR 385, 469, 494, 526, 530, and SPCR 1364.

Six Work Flats

1: builder and date not listed. One Bemis truck, two Sprague (15 h.p.) motors. Burned 6-1912.

2: builder and date not listed. One Bemis truck, two SRG (20 h.p.) motors. Burned 9-29-1908.

3: builder and date not listed. 22'0" long. One Bemis truck, two SRG motors. Burned 9-29-1908.

4: builder and date not listed. 22'0" long. One Bemis truck, two Sprague motors. Burned 9-29-1908

5: builder and date not listed. 35'0" long, 8'9" wide. Two Bemis trucks (5'8" wheelbase), two Thomson-Houston W.P. 50 motors. Burned 10-2-1908.

6: builder and date not listed. 35'0" long, 8'9" wide. Two Bemis trucks (5'8" wheelbase), two Thomson-Houston W.P. 50 motors. Burned 9-29-1908.

The Construction Journals have references to three Spare Work Orders (S.W.O.)involving Work Cars; the month given is when expenditures were first recorded.
Feb. 1902 S.W.O. 8261: build one Work Car for Track Dept. Total cost was $787.
Feb. 1902 S.W.O. 8263: build one Work Car for Track Dept. Total cost was $797.
Mar. 1902 S.W.O. 8271: build two Work Cars for Track Dept. Total cost was $1581.

The Construction Journal for Feb. 1904 records expenditures to "Repair and place vestibules on work Cars".

20 Snow Plows

1 "Mogul": A company memorandum dated January 2, 1894, stated that the snow plows (sic) were 39 ft. long, weighed 33 tons, had four 25 h.p. motors on the trucks, plus six motors for the wing and scoops. This refers to one large "conveyor plow" that was built or first used during the winter of 1893-1894. Company data on the car, called the "Jumbo Plow",as of September 1, 1899, indicated two Bemis C.B. trucks, four Thomson-Houston W.P. 50 motors, TCRT rheostat controller, and weight 65,170 lbs. (front truck 34,000 lbs., rear truck 31,170 lbs.). The entire front end comprised an endless chain with buckets (bucket elevator) which carried the snow back to a cross-conveyor, which in turn dumped the snow to the side of the track. A steel-plate wing plow controlled by a derrick on the "gate side" of the car bladed the snow to the side of the street. The record card information: built by TCRT, date not listed, 25'8" long, 6'10" wide, two Bemis trucks, four Thomson-Houston W.P. 50 motors, hand brakes, with four Sprague motors on the rotary (sic) plow. Burned 4-29-1908.

An article dated June 1896 reported that the company had 20 Snow Plows of the "pilot type" of which one was a large "conveyor plow". The "conveyor plow" was number 1, while the other 19 "pilot type" were shear plows numbers 2 thru 20. As of 9-1-1899 the weight on these 19 plows was listed as 44,000 lbs. evenly distributed.

A newspaper article dated November 16, 1900, reported that (1) 25 heavy snow plows were to be added for the winter, (2) cabs with room enough for ten men had been built on each car, and (3) the Stillwater line was to get a rotary snow plow.

As originally built, the motorman and plow operators were exposed to the weather. A motorman's cab was later installed on each car, termed a "front vestibule" on the record cards. Construction Journal entries imply that some of these cars were used as Snow Plows during the winter months and as Work Cars during the summer months.

January 1901	Remodel and mount Snow Plows.
March 1901	Work Car 4 altered for Snow Plow.
May 1902	Finish vestibule on Work Car 7.
February 1904	Repair and place vestibules on Work Cars.
April 1904	Dismount Snow Plow 18 for Storehouse Switch Car.
April 1904	Dismount Snow Plows and mount Open Cars. (Apparently trucks and motors from the double-truck Open Cars interchanged with the Snow Plows.)
December 1904	Install air brakes on the Stillwater Snow Plow. (This may refer to new Snow Plow 21, later re-numbered 25, built during 1904.)
April 1906	Equip two Snow Plows for Work Cars.
October 1906	Rebuild Stillwater Snow Plow. (May refer to number 25.)

The record cards list the same information on all 19 Snow Plows. Built by TCRT, date built not listed. Vestibuled front end. 25'8" long, 6'10" wide, wood underframe, two Bemis trucks (5'6" wheelbase, four Thomson-Houston W.P. 50 motors, TCRT controller, hand brakes, and weight 44,000 pounds. Dismounted summer 1904 at (1) Harriet, 14 cars: 1-11,16-17,19 and (2) Road Dept., 2 cars: 12 and 15.

The Construction Journals record that rail grinding equipment was installed on one car in October 1907.

Other information and dispositions follow.

2: Burned 9-29-1909
3: Burned 4-14-1908
4: Rebuilt to Track Dept. Work Car May 1910. Burned 6-1912
5: To East Side Station 10-4-1904. Burned 4-29-1908
6: Burned 4-16-1908
7: Burned 4-14-1908
8: Burned 4-14-1908
9: Burned 4-16-1908
10: To East Side Station 10-4-1904. Scrapped 4-29-1908
11: Burned 4-14-1908
12: Burned 4-19-1908
13: Rebuilt to Rail Grinder May 1911. Rebuilt to Work Car A13 3-25-1912
14: Rebuilt to Track Dept. Work Car May 1910. Rebuilt to Work Car A14 3-20-1912
15: Burned 4-19-1908
16: Sold to Aberdeen St. R.R. (S.D.) 12-1-1910
17: Burned 4-29-1908
18: Rebuilt to Storehouse Switch Car April 1904. Rebuilt to Rail Grinder January 1910. Received a K-6 controller. Burned 6-1912
19: To East Side Station 10-4-1904. Burned 4-29-1908
20: Rebuilt for Switcher at the new Main Steam Station 6-12-1903; received Christensen automatic air brakes (one 8" brake cylinder). Scrapped 8-10-1907

Nine Flat Trailers

1-5, 7: Flat Trailers, one Bemis truck. All Burned 6-1912.
6: Wood Shop Trailer, 22'0" long, 6'6" wide, one Bemis truck. Burned 6-1912
10: Work Car Trailer, 26'6" long, 6'2" wide, one Bemis truck. Burned 6-1912

12: Wood Shop Trailer, 31st St. Shops, one Bemis truck. Burned 6-1912

The Construction Journals record one single-truck Flat Trailer built during March 1905.

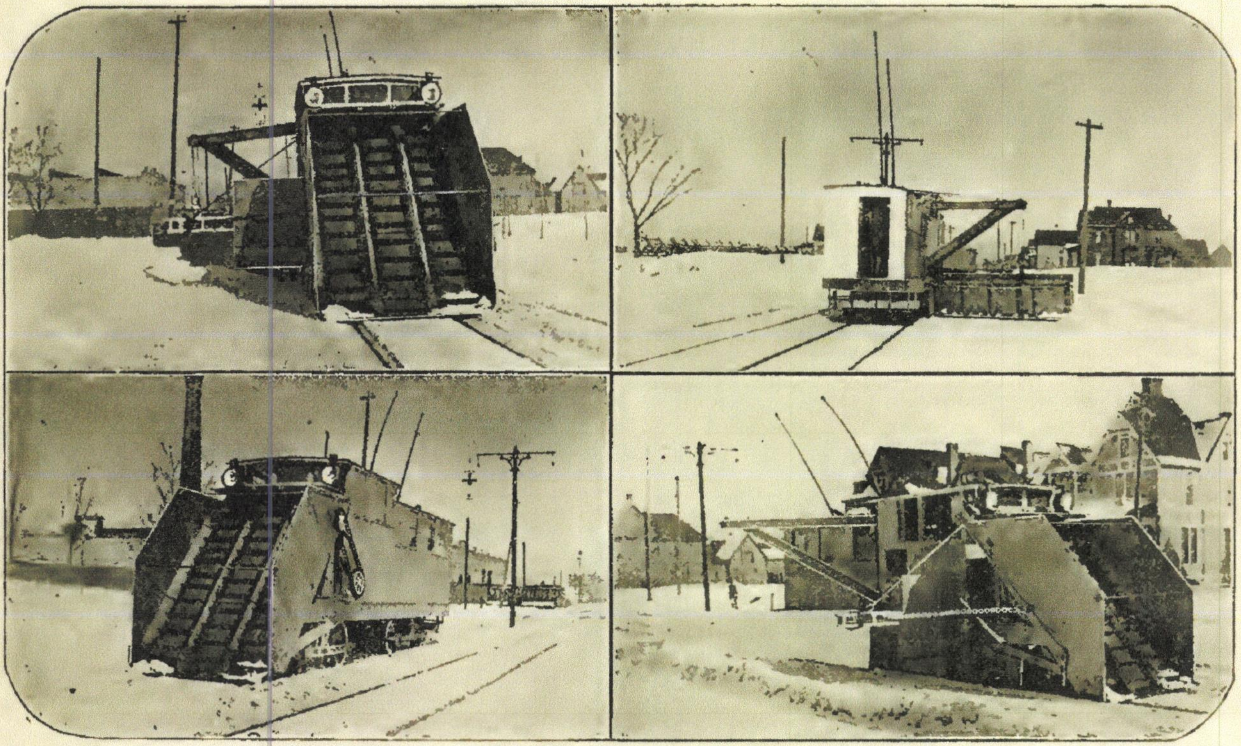
Notes

A memo from Walter J. Smith dated 1-5-1910 pertaining to equipment daily reports mentioned that entries for Switch Cars 1, 2, 26, the Test Car, and Wire Car 1 had been overlooked.
Wire Car 1 is described foregoing.
The Test Car is 796.
Switch Car 26 is one of the ex-Selby Hill counterweight "pushers" re-numbered in the new service equipment series.
Switch Cars 1 and 2 may be the other two ex-Selby Hill counterweight "pushers" that eventually were re-numbered 27 and 28; or could be 789/41 and 794/42.

A13 and A14 when rebuilt in 1912 had the snow removal equipment and fittings removed, the underframe steel reinforced and side-stake-pockets attached, and air brakes installed. As rebuilt they were 25'6½" long (cab 6'7"), 7'8½" wide, two Bemis trucks (5' 1 3'4" wheelbase), four G.E. W.P. 50 motors, 17:64 gear ratio, K-6 controller on A13 and K-14 on A14. A13 received a weed cutter on the front end while A14 was equipped with a 1,000 gallon tank on the rear deck for sprinkling calcium chloride. Disposition:
A13: Dismantled and burned 9-1936.
A14: Destroyed in the Snelling Shops Storage Shed fire 8-17-1925.

MAMMOTH SNOW PLOW AT MINNEAPOLIS.

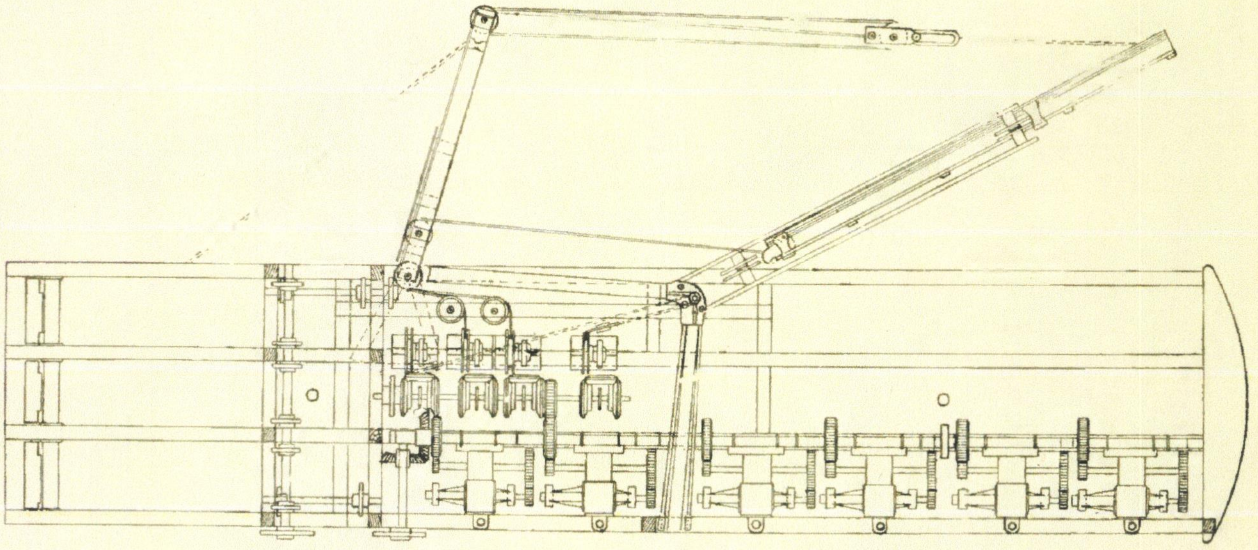
During the past winter what is probably the largest and most effective snow plow ever run on a street railway has been in use on the Twin City Rapid Transit Company's lines, at Minneapolis and St. Paul. In its construction, the well known but poorly acted upon principle is recognized, that to successfully fight snow something more must be done than to merely shove it to one side of the track. Piling the snow up on either side simply invites that subsequently falling, to drift deeper than ever. It also invites teamsters to take to the track and stay there. It is, in addition, important that the snow cleaning apparatus should be independent of the car movement in its action. This latter principle has been made use of in sweepers having the brushes independently driven, and which give excellent results. The Minneapolis plow, however, by the use of conveyors instead of brushes, disposes of a much larger quantity of snow in a more satisfactory way. The power required is, of course, enormous, but on a large system this is of only secondary importance, the main point being to do the work without delay. To remove the snow from the track, the scheme adopted on this plow is to raise the snow in front of the plow by means of conveyors. It is then dropped on a short cross conveyor, which throws it to one side. Heavy wings push back the snow coming from the conveyor, and in addition clear the roadway at the side. The front conveyor is nine feet long, and placed at an angle of forty-five degrees. The blades of the conveyor are sixty-six in number, having dimensions 24x6 inches. They are of $\frac{5}{16}$-inch steel, and are riveted to endless sprocket chains running on rollers. The front conveyor drops the snow on to a side conveyor, which is thirty inches long, and throws the snow out at the side of the car, where it is taken care of by the wings. The side wings have a fifteen foot sweep, and are two in number; the smaller one in the front to start heavy banks and to keep snow away from the plow, and a larger one behind it to do most of the sweeping. The front wing is a simple $\frac{5}{8}$-inch steel plate 4x6 feet, rigidly pivoted to the snow plow frame, and backed up by a channel iron beam eight feet long. The rear wing is made of two 60-pound steel T-rails, fifteen feet long, bolted at the top and bottom of a 4x15-foot plate of $\frac{1}{2}$-inch steel. It is a floating wing, having no rigid connection to the plow frame, and being elevated and carried by a jib crane. The crane is made of 8-inch channel iron, its height and length being, respectively, seven feet and twelve feet. It is supported at both ends by $\frac{1}{2}$-inch steel rope running over pulleys, in several turns. This wing, which is considered the most important feature of the plow, has a weight of 3,500 pounds. Inside of the plow are six redesigned Number 6 Sprague motors, which, after a 9 to 1 gearing reduction, are connected to a heavy 26-foot shaft. These motors supply power to the conveyors by means of an ordinary chain and sprocket wheel. By means of clutches these motors also supply power to adjust the height and sweep of the heavy 15-foot wing, which may thus be quickly taken from a 15-foot sweep, and folded in its "pocket" at the side of the plow. The steel ropes which change the position of this wing run over drums



THE MINNEAPOLIS MOGUL ELECTRIC PLOW

which receive their power from the motors by means of worm gearing. Each pair of Sprague motors has a controller and reversing switch.

The plow is mounted on two strengthened Bemis pivotal trucks, having 7-foot 6-inch wheel bases and 20-foot pivotal centers, giving a total wheel base of 27 feet 6 inches. Allen paper 33-inch wheels and 3¾-inch axles are used. Each truck is equipped with two W. P. motors, redesigned for great torque and slow speed. The horizontal effort exerted by each motor at 100 amperes with the 4.78 gearing reduction and 33-inch wheels, is 1,650 pounds or 6,600 pounds from the two trucks. The two motors on each truck are governed by a series multiple rheostat switch, such as is used on the company's cars. The clutches controlling the rear wing, and the handles governing the controllers for the six Sprague and the four W. P. motors with their reversing switches, cut-outs, etc., are conveniently placed near the upper part of the front end of the plow. On account of the drop in potential at the end of some lines, it was found impossible at times to estimate the current used by noting the speed of the plow, but by noticing a large dial ammeter the motors are kept from working too long above their capacity. In order to avoid the sputtering at the trolley wheel, with heavy currents, and the risk of burning off the overhead wire should the trolley come off, two trolleys are used. The length of the plow is 39 feet, and its weight 35 tons. It was designed and built by the engineers of the Twin City Rapid Transit Company, at its Minneapolis shops. It is built after designs on which the Railway Track Cleaner Company of Minneapolis, of which company Thomas J. Canney is president, owns the patent.



PLAN OF SNOW PLOW.

◆

A BIG car factory is reported to be established at Seattle, Wash. The plant to be established on Salmon Bay, at a place called Ballard.

NATIONAL ELECTRIC LIGHT CONVENTION.

An uninformed visitor to the National Electric Light Association, held at Washington, from February 27 to March 2, might, during one of the sessions, easily have thought himself at a street railway convention. We refer to the reading of the paper on "A Complete Metallic Circuit for Street Railways," by J. H. Vail, and the discussion which followed. Mr. Vail's paper brought out no new points on this subject, being valuable chiefly as a concise review of the matter in hand. The value of the rails as conductors, as against supplementary wires, and the importance of large bonds was well illustrated by both figures and diagrams. Indeed, after showing the absurdity of using copper conductors of ordinary size alongside the rails, it was rather surprising to see him lay so much emphasis on the importance of track feeders to various points of the system, which feeders, according to his own statements, must be of enormous size to be of any value as compared to the rails. However, the specifications made by him for the construction of a ground return are in general good, and can be carried out in practice with the best of results. An extensive discussion followed, in which several street railway men took part. C. W. Wason, of Cleveland, spoke of

THE CONTINUOUS RAIL,

and said that in conversation with President Moxham, of the Johnson Company, he was assured that the company would guarantee perfect work from a welding point of view. The company had been rather discouraged with the work done on the West End, at Boston, where the joints were made by welding the fish plates to the rail ends, but being urged on they had continued their experiments with more success. In the welding done now, the rails were simply butted together and the weld made at the ends. They have contracts for welding 150

1907

REMEDY FOR RAIL CORRUGATIONS IN MINNEAPOLIS

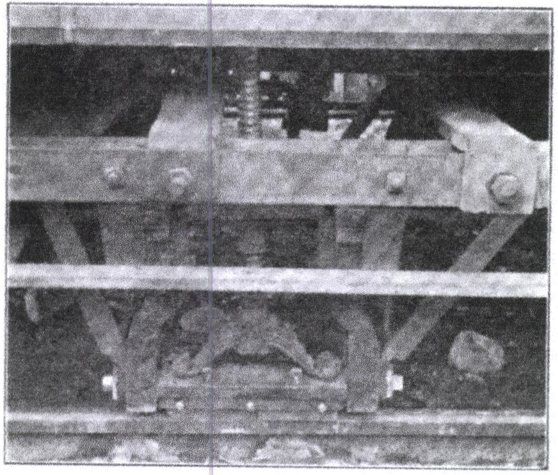
Minneapolis, Minn.

Editor Electric Traction Weekly:—

The Twin City Rapid Transit Company has in the last two years experienced an increasing amount of trouble with what is known as corrugated rail. Our rail is all T section and the trouble has occurred both on rail laid on concrete foundation, having a concrete beam under each rail, and also on track where the rail is supported on ties in the usual manner, laid 2 ft. center to center with the space between the ties filled with concrete. The paving in all cases is either stone or brick. No difficulty has been experienced where the track is laid on streets without a concrete foundation. The corrugations occur on both straight track and curves, and have appeared from two to three years after the track was laid.

The corrugations appear to be caused by the metal on the head of the rail flowing into ridges under the action of the rolling of the wheels. In the opinion of the writer this is because the steel is not of a quality that will sustain the work imposed on the rail.

Several devices for removing the corrugations have been experimented with, but the one which has given the best satisfaction is illustrated in the accompanying photograph. This device consists of carborundum blocks held firmly in such position that they can be applied with a planing action to the head of the rail. The photograph shows the appliance attached to an ordinary single truck car. This car is moved back and forth over the track which is corrugated, the blocks being pressed onto the rail by means of the springs and screws shown. This removes the corrugations and leaves the head of the rail smooth. The work must be done at night when the tracks are not in use.



Device for Removing Rail Corrugations

The cost of removing corrugations in this way varies from 2 cents to 5 cents per foot of single track according to the depth and amount of the corrugation.

This appliance is manufactured by the National Rail & Tramway Appliances Company of Liverpool, England.

Very truly yours,

G. W. L. Wilson,
Engr. Maint. of Way.

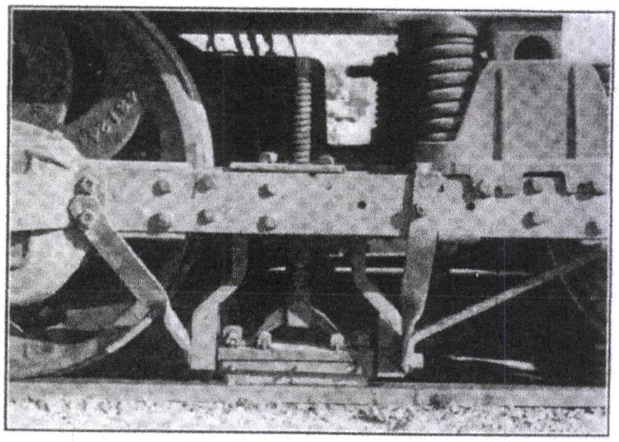


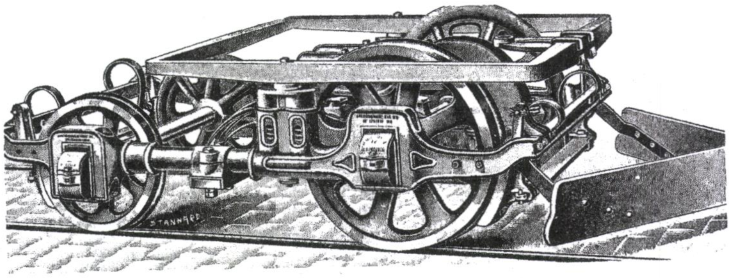
Fig. 15. Showing Rail Grinding Device in Use by Twin City Rapid Transit Company

ETW #18 10-29-1910

AMERICAN 2

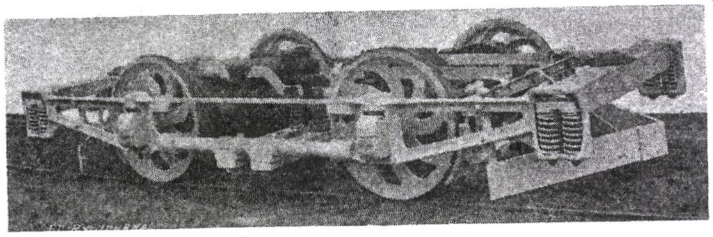
Maximum-traction type truck.
First built about 1895.
Inside motors. Outside brakes.
Tubular-frame truck.

707-731 Order #35



AMERICAN 3

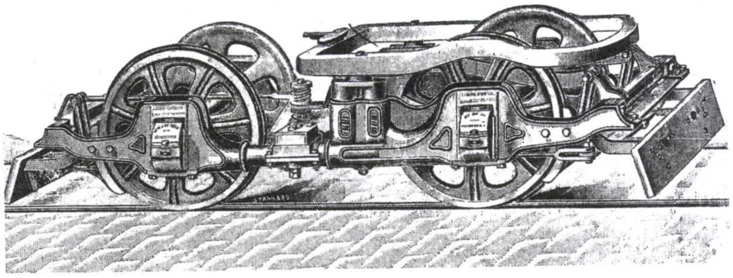
Single-truck. Two-point support.
First built in 1895.
Called Pivotal-bolster truck.
Inside motors. Outside brakes.



AMERICAN 4

Double-truck tubular frame type.
First built about 1895.
Outside brakes. Inside motor,
Used in Minneapolis and Los Angeles.

607-626 Order #19
607-626



American Car Company Order Books indicate the following TCRT cars were built with the trucks indicated.

607-626	Order No. 19	American 4
707-731	Order No. 35	American 2

The earliest photo of a car in the 607-626 series is in the November 1892 issue of *The Street Railway and Electrical News*. The trucks appear to be Bemis manufacture. The article states the trucks are of the same as used under the open cars [540-568 series] on the same line [Interurban], which were Bemis 29. Photos of 707-731 series cars are from a much later date which have Bemis 29 trucks.

My opinion is that the these cars were all built with Bemis 29 trucks.

DIRECTORIES: HORSECAR QUANTITIES

MINNEAPOLIS ST RY	
SRJ Jun 1885	146
SRJ May 1886	186
SRJ May 1887	186
SRJ Oct 1888	252
1-15-89 Mtg	218
1890 US Census	264

ST PAUL CITY RAILWAY	
1882	28
1884	77
4-1-84/10-1-84 Mtgs	79
SRJ Jun 1885	80
SRJ May 1886	82
1-5-87Mtg	93
SRJ May 1887	128
SRJ Oct 1888	128
1889	159
1890	108
1890 US Census	113

DIRECTORIES: CABLECAR QUANTITIES
ST PAUL CITY RAILWAY

	Grip Cars	Trailers	(Closed Trailers	Open Trailers)
Jan 1888	12	16	16	
Oct 1888	10	16	16	
1890 US Census	30	66	34	32
1-18-1893 Trumbull	38	66	34	32
1890 Electric Motor Cars	9			
Jan 1888 wrecked	1			

MAY 1897 DIRECTORY
SERVICE CARS

	Mpls	StPaul	Total	1-18-1893	Diff.
Snow Plows	22	15	37	37	0
Sweepers	2	7	9	2	+7
Salters	33	18	51	51	0
Scrapers	9	-	9	17	-8
Supply Cars	3	-	3	2	+1
Road Wagons	14	12	26	27	-1

St.Paul had 8 Scrapers in 1893. I wonder if it might have been reduced to 7 Scrapers by 1897 and listed in error under Sweepers. Or 1 Scraper converted to a Supply Car.

EARLY CARBUILDERS

John Stephenson Company
New York City

1843 built a plant on 27th St. between Madison and Fourth Avenues. 1845 expanded with a six-story building extended all the way to 28th St. Street address numbers often appear in builder's photographs. Based on other information such photographs can be dated:

39 to 47	1876-1885
35 to 47	1886-1889.

1898 moved to a new plant in Linden (Elizabeth), New Jersey. Sold to J. G. Brill Company 1904 but retained the Stephenson name.

Broownell Car Company
St. Louis, Missouri

Andrew Wight	1857/1858-1875	
Brownell & Wight Car Company	1875-1890	Frederick Brownell, Andrew Wight
	Wight resigned due to ill health 1875; died 1876. Brownell purchased the Wight interest in 1879 and incorporated the company.	
Brownell Car Company	1891-1900	Incorporated December 1890.

Sold to American Car Company 1900.

LaClede Car Company
St. Louis, Missouri

1883 founded by William Sutton (president) and Emil Alexander (secretary) who left Brownell & Wight Car Company. Another source included James P.Kelly (treasurer) and Thomas F. Colfer (director), also former employees of Brownell & Wight Car Company. June 1891 major reorganization after a dispute between Sutton/Alexander and Kelly/Colfer. The former sold their interests to the latter. Purchased by St.Louis Car Company 1903.

American Car Company
St.Louis, Missouri

1891 established by William Sutton (president) and Emil Alexander (secretary) who left LaClede Car Company which they had founded in 1883. Sold to J. G.Brill Company 1902.

J. M. Jones' Sons Company
West Troy, New York

John M. Jones	1862-1874	
J. M. Jones & Company	1874-1886	Father and two sons, John and Walter A.
J. M. Jones' Sons Company	1886-1912	

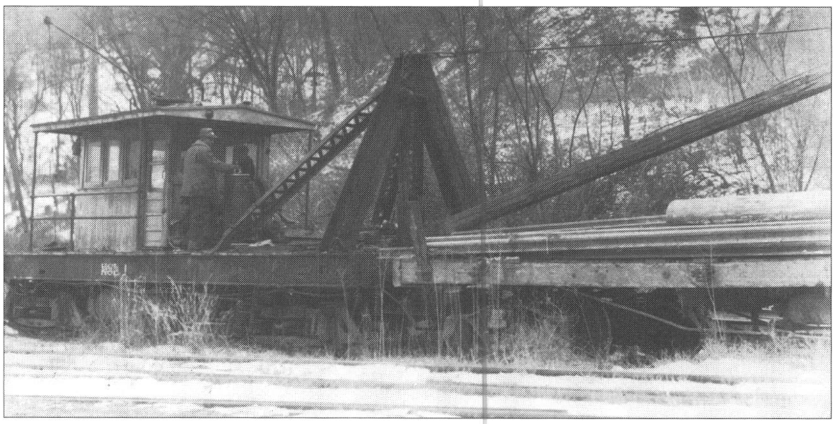
Pullman's Palace Car Company
Chicago, Illinois and Detroit, Michigan

1870 purchased the Detroit Car & Manufacturing Company, Detroit,. Michign. Operated by Pullman as the Detroit Car Works. Streetcars were built there. Sold (unverified) about 1900 to Detroit Street Railway. 1880 started building the Chicago plant, south of Chicago. Began building streetcars here 1891. 1899 reorganized as The Pullman Company.

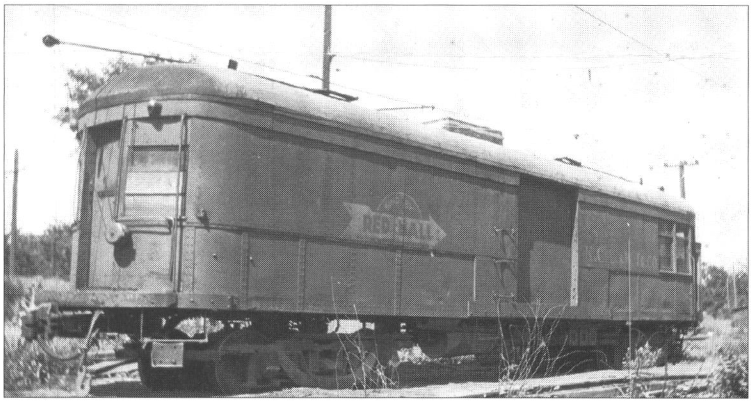
Bemis Car Box Company
Bemis Car & Truck Company
Springfield, Massachusetts

Manufacturer of car truck parts and car trucks 1889-1926.

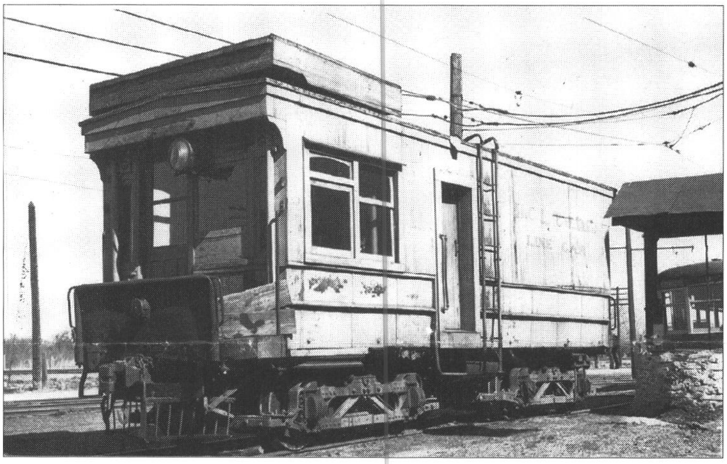
CONTENTS OF
BACK POCKET



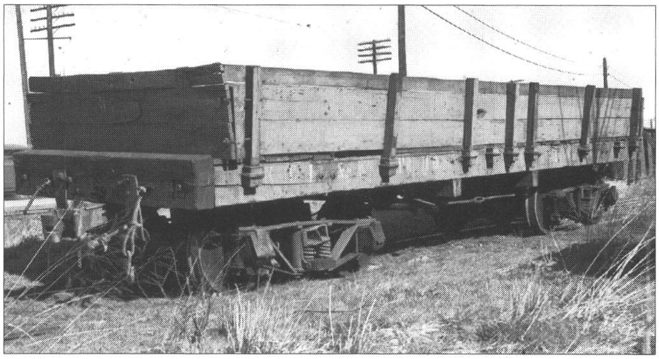
Derrick car 1 at Wolcott. December 27, 1935. (Ray Hilner/ Art Gibson collection)



Red Ball freight motor 8. July 8, 1936. (Ray Hilner/ Art Gibson collection)



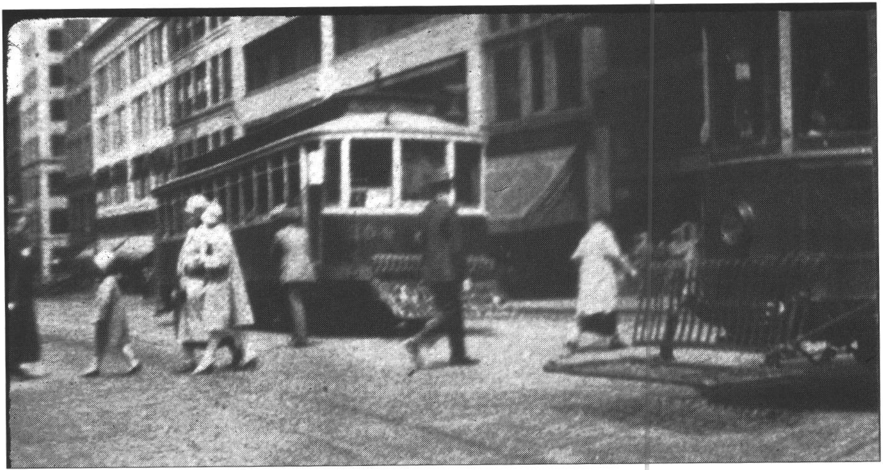
Line car and motor 11. Wolcott. April 3, 1938. (Ray Hilner/Art Gibson collection)



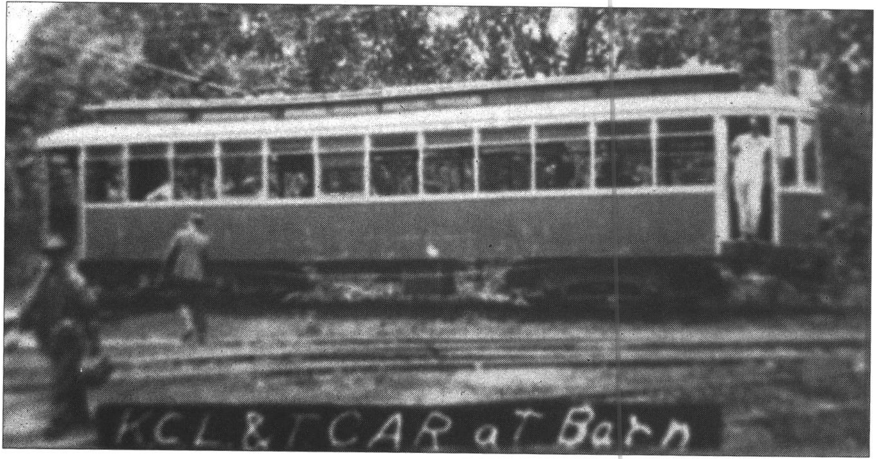
Flat car 23. April 3, 1938. (Ray Hilner/Art Gibson collection)

Table 2 –Kansas, Lawrence & Topeka Electric Railroad Roster of Rolling Stock

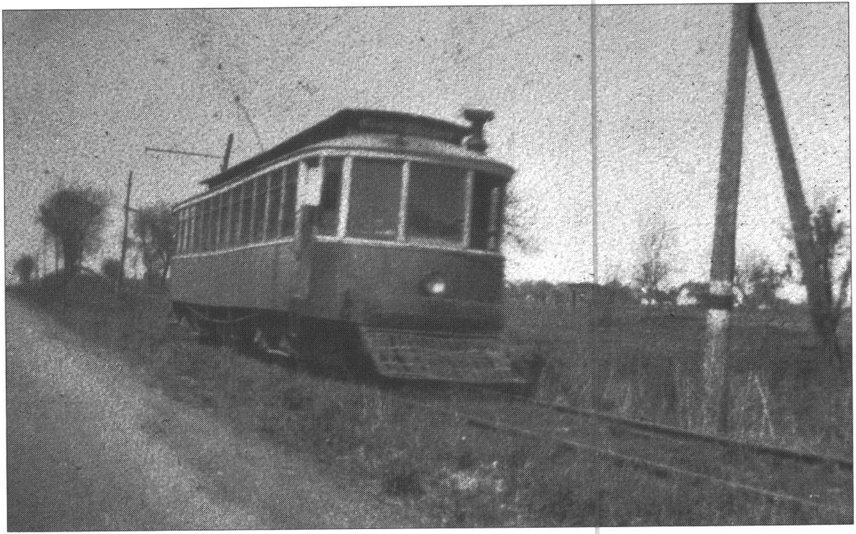
Car No.	Year Built	Type	Manuf (Order #)	Specifications	Notes
NA	NA	NA	NA	NA	Two cars leased from MSRy until purchase of own cars
50-53	May 1906	Streetcar	St. Louis Car	ST; two 35-hp motors, dark brown	"Goat" cars. One used between Rose Hill and Rosedale and a second between Rose Hill and East Zarah. Cars 50 and 52 may have been closed cars. Cars 51 and 53 may have been 10-bench open cars.
55	NA	Open streetcar	NA	ST	Exhibited at 1904 St. Louis World's fair. Sold to Minneapolis Street Railway. Purchased by Hocker line in 1907. Later built into line car.
100-104 (5)	NA	Interurban	St. Louis Car	DT; four 35-hp motors; 40 passengers	Acquired May 1906 from St. Louis Car; replaced by Twin City cars below
?? ~~(6)~~ (4)	1892	Streetcars	American Car	42'-6" long; 8'-9" wide; Brill 27A-1 DT; 48 passengers, two WP50 motors	Purchased used from Twin Cities Rapid Transit ~~as 613 and 620 in July 1914~~; 616 in Dec. 1916; and 610, 622 and 623 in Jan thru Apr 1917. ~~Some~~ cars ~~may have been~~ acquired as bodies only.
NA	NA	Auto passenger bus	NA	NA	Used Model T Ford truck outfitted with seats for 15 passengers for use on Rose Hill-East Zarah run. Withdrawn from service after a few months.
NA (3)	NA	Motor freight	NA	NA	Referenced in 1924 McGraw Electric Railroad Directory; one might be ST streetcar acquired in 1914 or 1919 from MSRy and converted to freight trolley by removing passenger seats and other modifications
NA (1)	NA	Trail freight	NA	NA	Referenced in 1924 McGraw Electric Railroad Directory
NA (2)	NA	Motor service	NA	NA	Referenced in 1924 McGraw Electric Railroad Directory; one might be rebuild of car leased form MSRy
NA (3)	NA	Trail service	NA	NA	Referenced in 1924 McGraw Electric Railroad Directory



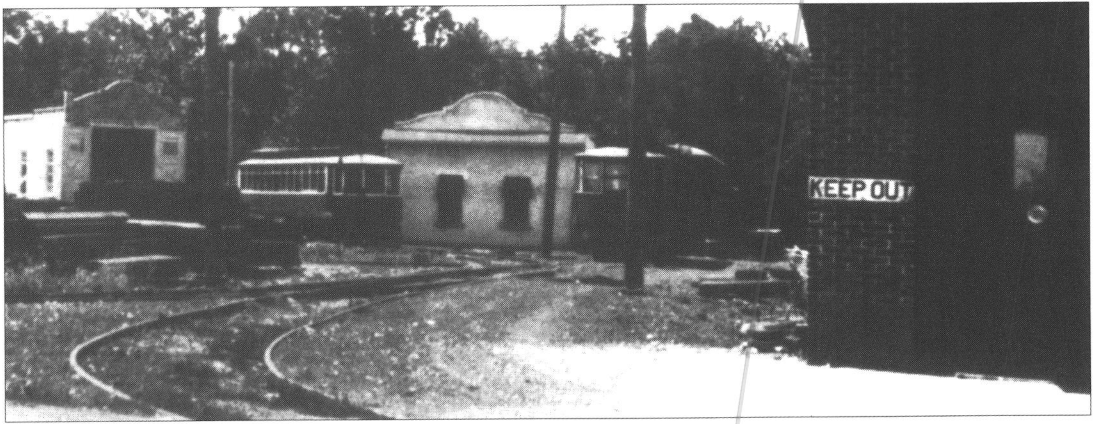
Car 104 at 12th and Main in KCMO shortly before abandonment
(Terence W. Cassidy Collection KC302/UMKC WHMC) 1927



One of the double-truck cars at the car barn in Merriam. Unlike the other lines, the Hocker Line used lighter-weight streetcars all of its life. (Terence W. Cassidy Collection KC302/UMKC WHMC)

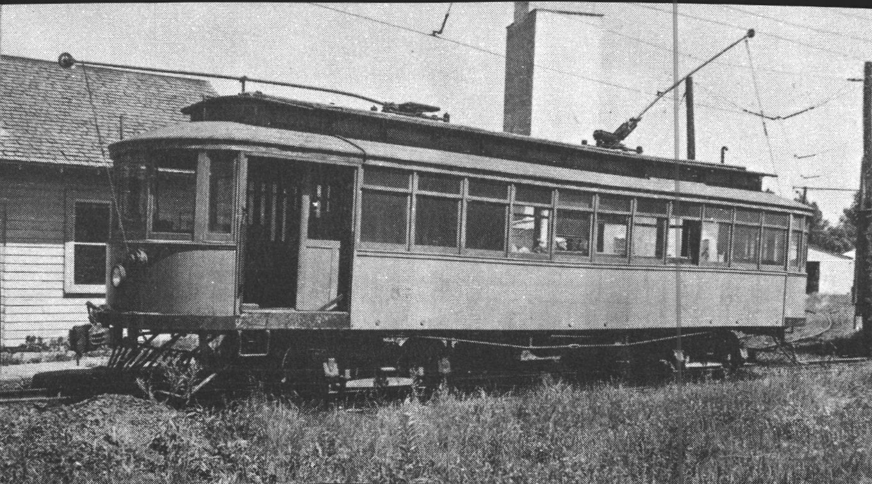


Much of the Hocker Line track was along roads, which kept speeds down
(Terence W. Cassidy Collection KC302/UMKC WHMC)



Original cars 01-04 purchased from Twin Cities Rapid Transit cars on siding west of Bonner Springs car barn (Russ Olson)

KCKV•W



52
52

LaClede Car Co. paint book
at National Museum of
Transport St Louis

Color side elevations of
MSA #303 LaClede 303-362 12-90
OSA (19-30 10-90
or
31-37 3-91
or
38-43 7-91

THE STREET RAILWAY JOURNAL

Vol. VII. *NEW YORK & CHICAGO, APRIL.* *No. 4.*

The Short Gearless Motor.

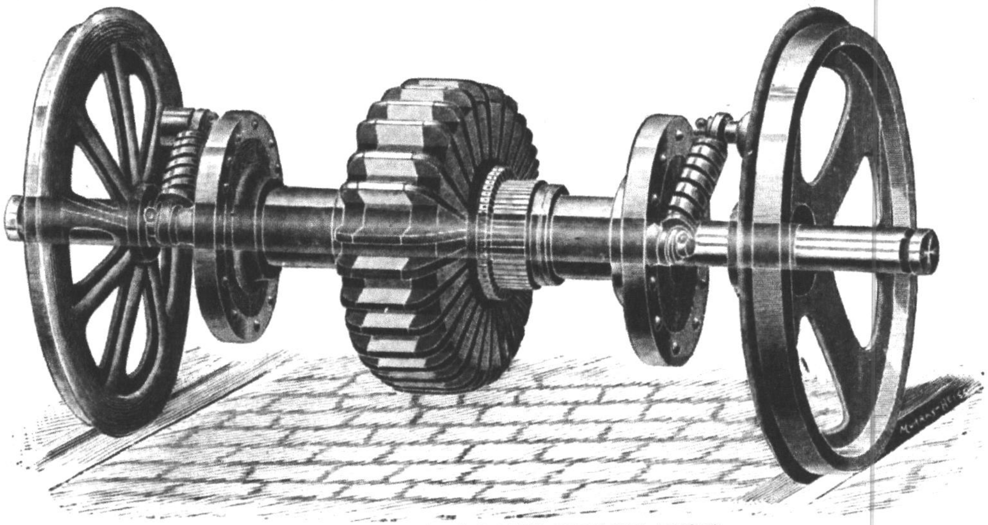


FIG. 1.—ARMATURE OF SHORT GEARLESS MOTOR.

Those who have been watching the evolution of the electric motor have noted how, step by step, and even with long strides, one electric company after another, in answer to the urgent demands of practice, have been presenting machines that do away with intermediate shaft, boxes and gears in order to reduce the cost of repairs and maintenance, and to suppress the noise, but it has fallen to the lot of the Short Electric Railway Co. to be the first to introduce a motor which eliminates all gears, and at the same time to overcome the objections heretofore made against mounting the armature on the car axle.

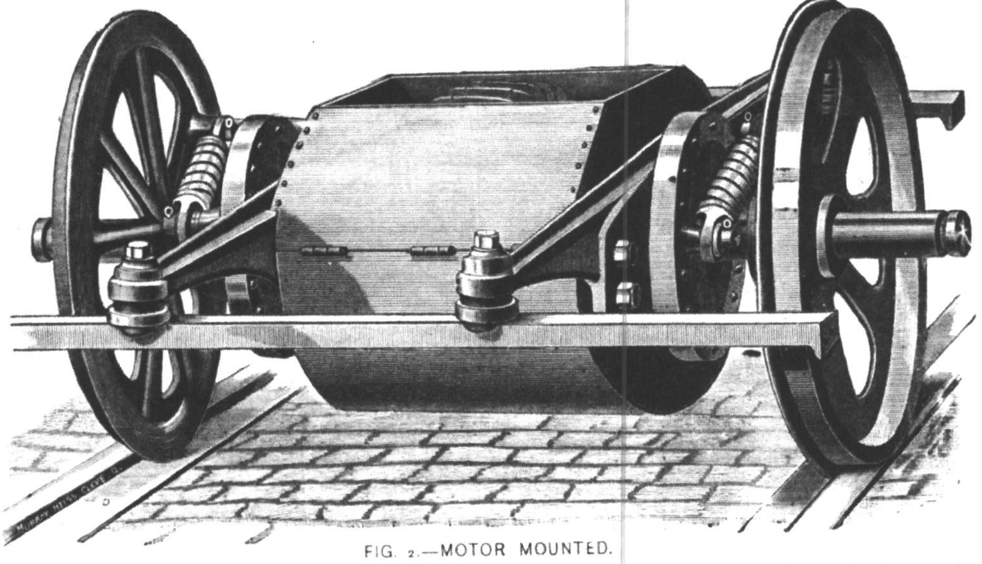


FIG. 2.—MOTOR MOUNTED.

Knowing that the reader is already impatient to know just how this is done, we leave the introduction and at once proceed to describe this peculiarly designed motor, as illustrated on this and the following page. By reference to Fig. 1, it will be noted that this gearless motor is mounted on a hollow steel shaft, which embraces the car axle but does not touch it. The hollow shaft being six inches in diameter with a thin shell, there is left nearly five inches inside diameter and a clearance between the axle of the car and the inside of the hollow shaft of an inch air space all round. The hollow armature shaft is mounted on bearings supported by peculiar shaped steel castings, Fig. 2., having arms projecting forward and backward, which are cushioned upon channel bars extending from side to side of the motor frame. The rubber cushions on which the motor frame rests are limited in their movement so that the inside of the armature shaft cannot come down upon the axle by a fixed distance.

The armature, Fig. 1, which is of the well known Short type with its separate bobbins and laminated ring, is mounted with its commutator near the middle of the shaft which has keyed to either end a heavy crank disk, made with an iron hub and rim and wooden web similar to the wooden web gear blanks which have heretofore been used on the Short motors. The wooden web thoroughly insulates the armature shaft from the rim of the crank wheel. Heavy coil springs, shown in the figure, capable of pulling with a very slight elongation, some

Digitized by Google

2,500 or 3,000 lbs. each, are connected by means of crank pins with the rim of the crank disks and the car wheels, so that the power of the motor in turning the wheels is transmitted through these springs, and the wheel is readily turned in the direction in which the armature tends to rotate.

A complete motor is shown in Fig. 3, with a casing covering the entire machine. The casing is made of boiler iron one-quarter of an inch thick, open at the top for ventilation, with the lower half divided into two parts which are hinged on each side and held together at the bottom with a latch fastening. The motor may be inspected from below by running the car over a pit, when the lower parts of the casing may be opened out. In case repairs to the armature are necessary, the lower half of the casing may be removed by taking out the hinge bolts and after removing a portion of the axle box frame, the car body can be jacked up, carrying with it the upper portion of the frame, casing and field magnets, leaving the armature axle and wheels free, so that they may be rolled out and another set put in their place with the shortest possible delay, one man being able to make the change.

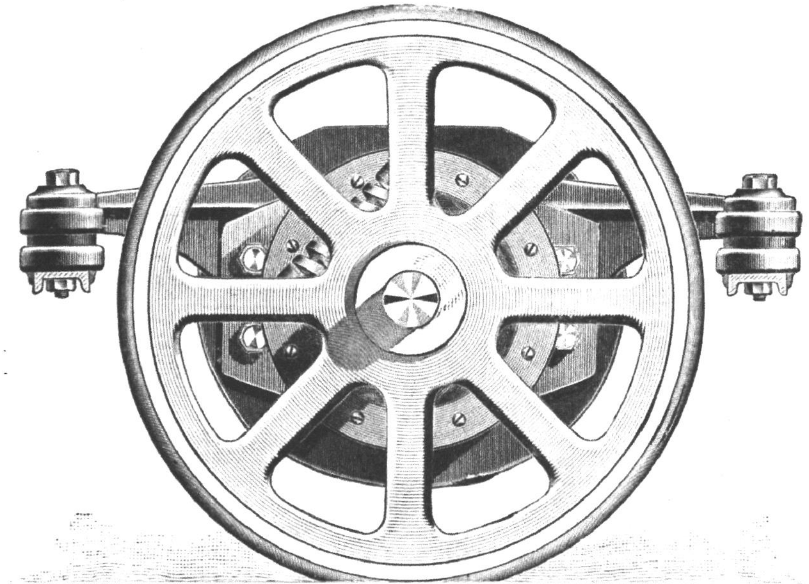


FIG. 3.—COMPLETE MOTOR WITH CASING.

A complete truck equipped with two motors is shown in Fig. 5, and its extreme simplicity is in striking contrast with the trucks equipped with the old type of motors in which the space between the wheels is entirely filled up with the gear apparatus.

The commutator and brushes being inside the casing, are entirely protected from dust and water, while the slow speed of the armature—not more than 100 to 150 revolutions per minute—prevents the humming and fretting sounds caused in high speed armatures by the brushes in contact with the commutator. The slow speed of the armature in this motor does away with many other difficulties inherent in high speed machines, viz: the commutator does not heat perceptibly; practically no eddy currents are set up in the armature core or the metal of the motor frame, which allows them to remain perfectly cool; the centrifugal force being slight there is no tendency to burst the commutator or to throw the bobbins off the armature. Little oil will be required to keep the bearings lubricated, and the wear upon them will be very slow; besides, the bearings are large and conveniently located.

For these reasons it is claimed that a speed of twenty-five or thirty miles an hour will mean no more to this motor than a speed of eight or ten miles to the ordinary high speed motor.

Other difficulties, it is expected, will be entirely overcome by the peculiar method of mounting this motor. The entire weight of the motor, it will be noted, is carried on springs where, heretofore, one end only has been flexibly suspended; this will prevent the destructive hammer blow upon the rails, with resulting low joints, common to heavy motors mounted directly upon the axle without a spring device. It will also prevent the tendency to crystallization and final breaking of the motor frame. These motors are constructed entirely of wrought iron and steel, all the parts being made strong with a large factor of safety.

The weight of the new motor is practically the same as that of the standard motor made by the Short company, but its efficiency is somewhat greater, especially at normal loads of from five to ten horse, and it requires much less current to operate a car, than is required with high speed motors.

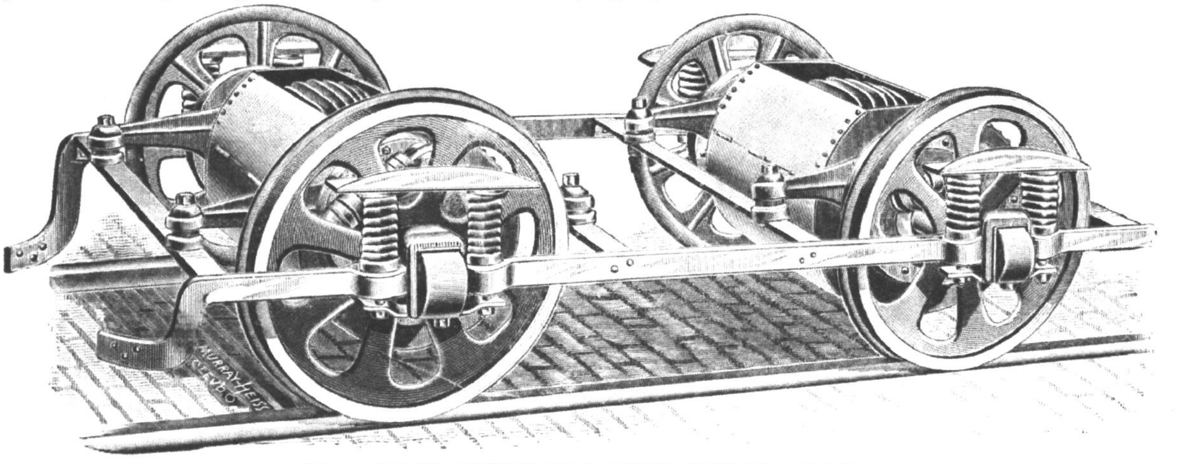


FIG. 4.—TRUCK EQUIPPED WITH SHORT GEARLESS MOTOR.

The ordinary rheostat and controlling mechanism used by the Short company are used with this machine, but the car starts without jerk or jar owing to the use of the coil spring between the crank disks and wheels.

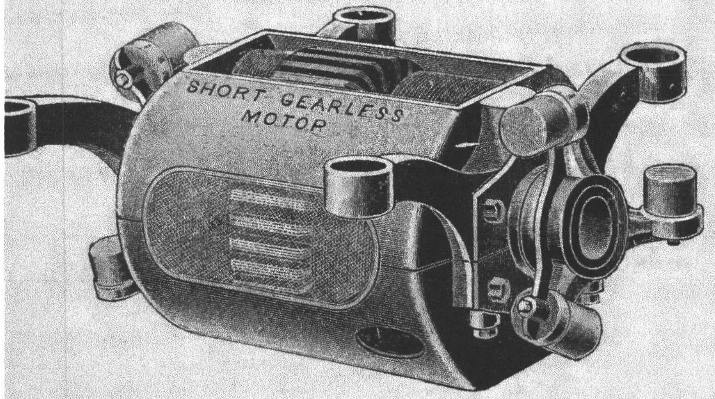
Owing to the barrel shape of the casing, the car will pass without harm over high crossings, stones or other obstructions, which often do great damage to dust pans, curtains and other low parts common with former equipment.

The advent of gearless motors comes to satisfy the pressing demands of the street railway managers—who have had two or three years' experience with electric

Digitized by Google

THE THREE SHORT RAILWAY MOTORS.

ACTUAL daily service with the Short Gearless Motor, since its announcement some seven months ago, has demonstrated all that was claimed for it, having proved efficient, reliable and entirely successful. The salient features of this machine are considered by Prof. Short, after the most careful study, as the indispensable requirements of a gearless motor for railway work, and are: the multipolar field; the small magnetic gap; and a ring armature of comparatively large diameter. A brief description will be of interest.



SHORT GEARLESS MOTOR.

From the cut, it will be seen that all gearing is eliminated from the machine. The number of bearings is reduced to two on each motor, making four in a car equipment. The armature speed has been reduced to the minimum, viz.: that of the car axles in practical operation. The noise of gearing and the "squealing" of commutator brushes are entirely obviated, and there are but three wearing parts on each motor. The armature is of the ring type, of comparatively large diameter and increased "leverage." It is keyed to the hollow steel shaft, which is concentric with the axle of the truck, and an inside clearance of one inch all around is provided for. The coils of the armature are in this, as in all Short machines, entirely independent and perfectly ventilated.

The motor has eight field magnets, four on each side of the armature. They face each other at a distance of only ten inches and thus form a most intense magnetic field. They are bolted to the frame work of the motor, in the center of which are the bearings which carry the hollow armature shaft.

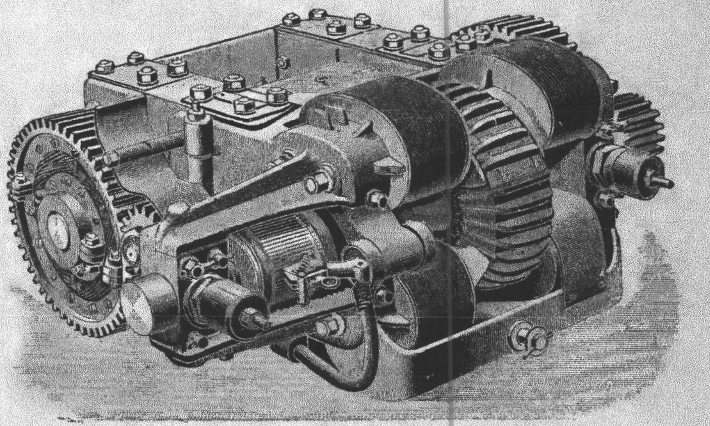
Mounted upon the hollow shaft, close to the armature, is the commutator, which is protected from injury by the surrounding pole pieces. It is massive in construction and much larger than any commutator heretofore used, the idea being that because of its massiveness and slow speed, the wear would be reduced to a minimum. Six months' operation of these motors has proved the correctness of this idea and disclosed other distinct advantages in the use of the enlarged commutator.

A glance at the cut will show the method of mounting this simple machine. A three-armed spider is placed upon each end of the hollow shaft. Each arm is provided at the extremity with a socket to receive a rubber cushion or spring. These cushions bear upon lugs cast on the car wheels, and as the armature shaft and spider revolve, the action is imparted to the car wheels. This rubber cushion serves the double purpose of insulation and easy starting.

Great care is taken in insulating the motors from the truck. At a speed of 12 miles an hour, the armature revolves at 94 revolutions per minute, turning a 36-inch wheel. The equivalent speed of the single reduction motor is about 400 and of the double reduction 800 revolutions per minute.

As a result of several thousand readings taken on Cleveland lines, the following average electrical output has been noted: Average volts, 480; amperes, 24; E. H. P., 15.44; passengers, 48.

Figure 2 shows the Short "Double Reduction" or Geared Motor, which is already familiar to every reader of the REVIEW. This motor was the first put out by the Short Company, and in it were developed the characteristics which are now always associated with Short electrical machines For instance, the ring armature, multiple fields, large size commutator and such an arrangement of parts as admits of their perfect ventilation. This and the "Water Tight" are the only motors on the market having wooden web gearing, by means of which the perfect insulation of the motor from its frame and truck have been secured. The pinions are of solid steel, of large diameter and with large teeth. The rim of the wooden web gear is of cast steel. The motor frame in this, as in the other two forms of motor, is in one piece and is held by flexible supports.

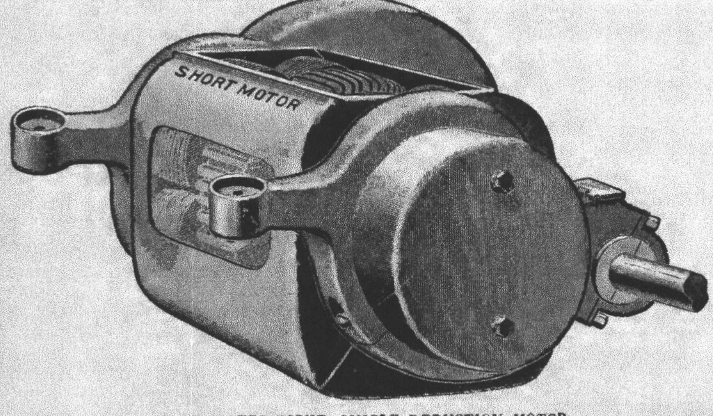


SHORT DOUBLE REDUCTION MOTOR.

The Short Company has made no mistake in calling this motor its "Standard" motor, the advent of the "Gearless" motor with its obvious improvements not having lessened in any way the popularity of the "Standard" equipment.

The "Single Reduction" or "Water Tight" motor is shown in figure 3. One pinion and one gear have been dispensed with and arrangements made to run the remaining gear in oil. The machines are practically the same, and a series of efficiency tests show that in economy of current and output of power, there is little choice between them. The "W. T." motor, however, is smaller than the "Standard" motor and it is claimed is the lightest and smallest street car motor thus far constructed. It weighs something less than 1,800 pounds. It is encased in and entirely protected by its iron frame and can be operated on 30, 33 and 36-inch wheels, and on any gauge of track down to 3 feet. It is in great demand for narrow gauge roads and for mining and other electrical haulage purposes. It is made in two standard sizes, 15 and 20 H. P.

Carefully kept records of the operation of electric cars on the many roads equipped with Short geared motors show that the cost per car mile ranges from 2 to 4 mills. In this connection, it will be interesting to our readers to compare the official report of the Rochester Railway Company, published in our last issue, with reports from other large railways in various parts of the country operating electrical apparatus of other systems. The small, direct cost of repairing those motors is, however, only one part of the problem. The length of time consumed in making repairs enters into every record kept by street railway companies, and one of the most valuable features of all Short machines is the facility with which they can be repaired in case of necessity. By loosening four bolts in the motor frame work and taking off the iron strips below the wheel box, a car equipped with "Gearless" motor may be jacked up, and axle, wheels and armature complete, run out from under the car. The armature coils may be rewound without removing the armature from the car axle. Field coils can be repaired as easily. The commutator may be reached and dressed while the machine is running.



SHORT WATER-TIGHT, SINGLE REDUCTION MOTOR.

With the geared motors it is not necessary to remove the motor and car wheels. A car can be run over a pit and every part of the motor reached without difficulty. The commutator, field coils and armature are easy of access, and the armature can be removed in case of necessity by two men in eight minutes, its weight being only 198 pounds. In fact every part of the motor can be removed without taking the machine to pieces. The bearings of the car motors are twice oiled and the comparatively slow revolution of the armature reduces natural wear to a minimum.

The Jamestown (N. Y.) Street Railway operated ten cars a period of eleven weeks, with a total loss of but two car days. On the Rochester (N. Y.) Railway, during eight months of operation, the total cost of repairs, including material and repairs to electrical machinery, was but 4 mills per car mile, and the average loss per car was but 4 per cent. of the total mileage.

It is not surprising, with such results as these, that the Short Company express the confidence they feel that they manufacture the most successful and economical electric railway apparatus to be purchased to-day.

FOREIGN FACTS.

The City & South London Railway receipts are increasing at the rate of a hundred pounds ($500) per week.

The municipal government of Auld Reekie has refused to allow a trial electric road to be constructed at Edinborough.

The Roundhay Electric Tramway is ready for service. The supplies were bought from an American company's English agency.

The Electrical Engineer, of London, publishes Hon. John W. Beckley's valuable paper before the New York convention, in its issue of October 2.

Captain John Marshall Gillies died recently at his home in London. He, too, was chairman of two large roads and director in four others. He was a very successful manager.

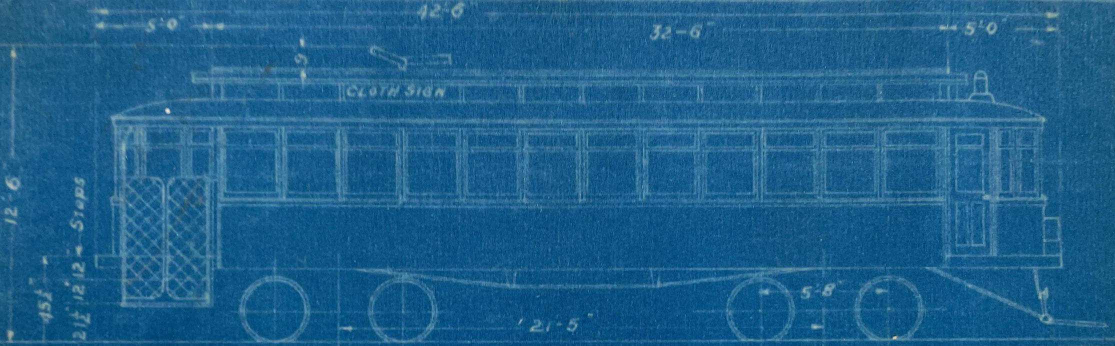
The Isle of Guernsey has had a steam street railway line since 1879, but the omnibuses have so cut into their traffic that electricity will replace steam with hopes of regaining lost patronage.

The Hawaian government has granted an English company the right to construct electric railways on the island when the traffic calls for the discontinuance of the horses. The horse service costs 4.46 d per mile.

Mr. T. Smith, a prominent English electrician, five years with the Inmusch works at Kentish Town, has been appointed secretary of the General Electric Traction Company, vice Secretary Mackenzie, deceased.

The death of Alfred J. Lambert, one of the prominent English tramway managers, has occurred. He was chairman of the Anglo-Argentine & Imperial Tramway Companies, and director in several other lines, and an energetic promotor.

Siemens & Halske, of Berlin, have overcome all difficulties menacing the success of the projected Barmen-Elberfeld Elevated Electric Railway. The road in question will parallel the Wupper river a long distance, finally crossing it on a massive wrought iron bridge.



Cars	Built	Cars	Built	Cars	Built	Cars	Built
608	7-9-92	621	7-9-92				
609	7-9-92	622	7-9-92				
610	7-9-92	623	7-9-92				
611	7-9-92	624	7-9-92				
612	7-9-92	625	7-9-92				
613	7-9-92	626	7-9-92				
614	7-9-92						
615	7-9-92						
616	7-9-92						
617	7-9-92						
618	7-9-92						
619	7-9-92					Total	
620	7-9-92					19 Cars	

Make	American	Air	Christensen	Trolley Wheel 4"
Weight	43,000	Air Cyl	8	Wooden Underframe
Cost	5015^{25}	J Box	Mc Cord	45½" from rail to floor
Width	8-9	Trucks	Brill 1900	Width inside 7'-10¼"
Seats	+4 =	Brakes	Outside hung	Width of aisle 22¼"
Capacity	125	Axles	Steel 6"-8⅞"	30 Readings
Exits	Rear	Journal	4¼"x8"	
Rear Door	Single	Wheels	Chilled 33"	
Platform	Straight	Wheelfit	5½"	
Heater	Baker	Gears	64 T. Cast Steel	Class A3h
Register	Double	Gearfit	5½	
Motors	4 W.P.	Pinions	17 T. Forged Steel	URBAN CAR
25 H.P per motor		Trolley Base	G.E No 6	
Controller	K6			Sheet No